

DEPARTMENT OF TRANSPORTATION STATE OF GEORGIA

OFFICE OF DESIGN POLICY & SUPPORT INTERDEPARTMENTAL CORRESPONDENCE

FILE P.I. # 0014133

OFFICE Design Policy & Support

Cherokee County
GDOT District 6 - Cartersville
SR 20 Widening from CR 765/East
Cherokee Drive to SR 369

DATE 11/14/2017

FROM  for Brent Story, State Design Policy Engineer

TO SEE DISTRIBUTION

SUBJECT APPROVED CONCEPT REPORT

Attached is the approved Concept Report for the above subject project.

Attachment

DISTRIBUTION:

Hiral Patel, Director of Engineering
Joe Carpenter, Director of P3
Albert Shelby, Director of Program Delivery
Darryl VanMeter, Assistant Director of P3/State Innovative Delivery Administrator
Kim Nesbitt, Program Delivery Administrator
Bobby Hilliard, Program Control Administrator
Cindy VanDyke, State Transportation Planning Administrator
Eric Duff, State Environmental Administrator
Bill DuVall, State Bridge Engineer
Andrew Heath, State Traffic Engineer
Angela Robinson, Financial Management Administrator
Lisa Myers, State Project Review Engineer
Monica Flournoy, State Materials and Testing Administrator
Patrick Allen, State Utilities Engineer
Benny Walden, Statewide Location Bureau Chief
DeWayne Comer, District Engineer
David Acree, District Preconstruction Engineer
Jun Birnkammer, District Utilities Engineer
Cleopatra James, Project Manager
BOARD MEMBER - 11th Congressional District

**DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA
PROJECT CONCEPT REPORT**

Project Type: Reconstruction/ Rehabilitation	P.I. Number: 0014133	
GDOT District: 6	County: Cherokee	
Federal Route Number: N/A	State Route Number: 20	
Project Number:	N/A	

Widening of SR 20 from CR 765/East Cherokee Dr to SR 369

Submitted for approval:
Scott Gero, AECOM

6/30/17

Consultant Designer & Firm

Date

Albert Shelby KWN

7/14/17

State Program Delivery Administrator
Cleopatra James *Cleopatra James*

Date

7/7/17

GDOT Project Manager

Date

Recommendation for approval:

State Environmental Administrator

ERIC DUFF/EKP*

Date

7/18/2017

FOR State Traffic Engineer

CHRISTINA BARRY/EKP*

Date

7/31/2017

FOR Project Review Engineer

ERIK ROTHDE/EKP*

Date

7/29/2017

FOR State Utilities Engineer

KEVIN CONAN/EKP*

Date

7/27/2017

FOR District Engineer

DAVID ACREE/EKP*

Date

7/28/2017

State Bridge Engineer

BILL DUVALL/EKP*

Date

7/31/2017

☒ MPO Area: This project is consistent with the MPO adopted Regional Transportation Plan (RTP)/Long Range Transportation Plan (LRTP).

☐ Rural Area: This project is consistent with the goals outlined in the Statewide Transportation Plan (SWTP) and/or is included in the State Transportation Improvement Program (STIP).

State Transportation Planning Administrator

CINDY VANDYKE/EKP*

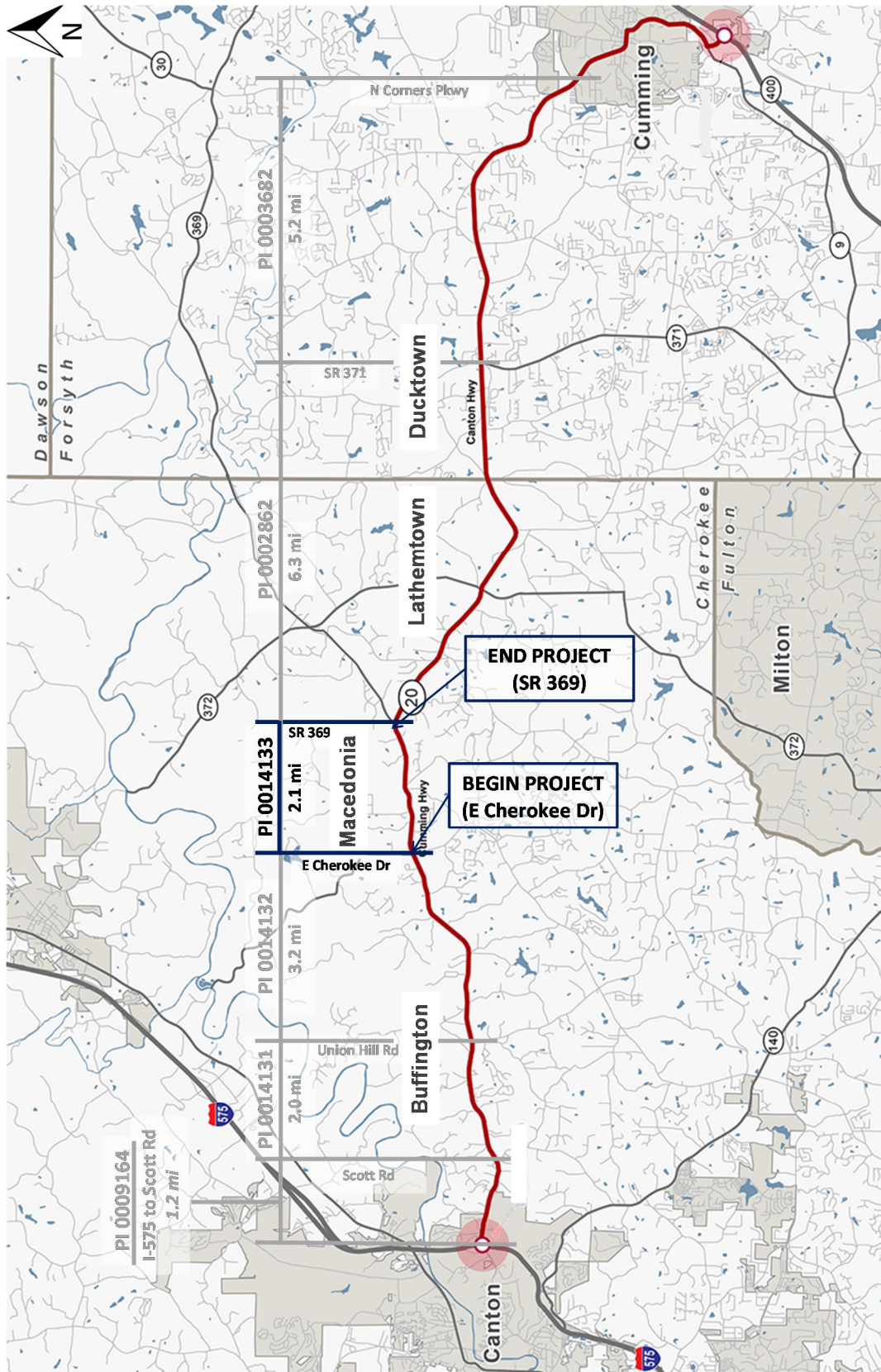
Date

7/19/2017

** - RECOMMENDATION ON FILE*

County: Cherokee

PROJECT LOCATION MAP



County: Cherokee

PLANNING AND BACKGROUND

Project Justification Statement: The following Project Justification Statement was provided for PI 0003681, PI 0002862, and PI 0003682 by the Office of Planning on June 18, 2012. PI 0003681 was later divided into three separate projects: PI 0014131, PI 0014132, and PI 0014133.

SR 20 is a two lane corridor from I-575 to just west of SR 400 where it changes to four lanes south of Crestbrook Drive/Forsyth County through the SR 400 interchange. Based on 2011 Average Annual Daily Traffic (AADT) the current level of service (LOS) of SR 20 from I-575 to SR 369 is “F” with an AADT of 25,650. The SR 369/Cherokee County to SR 371/Forsyth County segment has an AADT of 13,550 and LOS “D”. SR 20 from SR 371 to Crestbrook Drive has an AADT of 22,400 and LOS “E”. SR 20 increases to a four lane corridor from south of Crestbrook Drive to SR 400 and has a LOS “C” and AADT of 34,200.

On the western end of the project, the no build scenario design traffic (2040) for SR 20 is 53,550 with LOS “F”. Between SR 369 and SR 371, the 2040 traffic is 35,050 with LOS “F”. SR 20 between SR 371 and SR 400 has a LOS of “F”, with design traffic of 42,000 where SR 20 is two lanes. Where SR 20 is four lanes west of SR 400 it is LOS “D” (52,950).

SR 20 is classified as an urban principal arterial from I-575 to Union Hill Rd/Cherokee County, a rural principal arterial from Union Hill Rd. to County Line Rd, and then an urban principal arterial again from County Line Rd to SR 400/Forsyth County. The crash rates for the section of SR 20 in Cherokee County (east of I-575) were above the statewide average for the urban principal arterial and below for the rural principal arterial road in the years 2007-2009. The rates for the portion of SR 20 classified as an urban principal arterial in the years 2007-2009 were 245, 200, and 320 crashes per 100 million vehicle miles traveled (MVMT), whereas the statewide averages were 176, 170, and 165 crashes per 100 MVMT. The rates for the portion of SR 20 classified as a rural principal arterial in the years 2007- 2009 were 228, 186, and 173 crashes per 100 MVMT respectively, whereas the statewide averages were 249, 249, and 235 crashes per 100 MVMT. The crash rates for the portion of SR 20 in Forsyth County were all above the statewide averages. In the years 2007-2009 the crash rates were 480, 459, and 290 crashes per 100 MVMT for an urban principal arterial.

The future (2040) traffic for this section of the SR 20 corridor is anticipated to have deficient LOS, from I-575 to SR 400. West of I-575 traffic volumes on SR 20 decline from 23,500 ADT (LOS B) to 15,950 ADT (LOS D). Therefore, it is the opinion of the Office of Planning that I-575 could serve as the western logical termini. The four-lane section starting at Crestbrook Drive would serve as the eastern termini.

The Statewide Transportation Plan defines acceptable LOS as “A” to “C”, with sometimes “D” being used in large urban areas based on the circumstances. The goals of these projects are to alleviate present and future congestion along SR 20 between I-575 and SR 400 and to reduce the crash frequency along the corridor.

Existing conditions: The existing highway consists of primarily a rural two-lane, undivided section from the project beginning at E Cherokee Dr to the project end at SR 369, with some left and right turn lanes at larger intersections. There is a 14' flush median between Doc Latham Trail and Northwoods Dr (approximately 0.2 miles). There is an eastbound truck passing lane from Old Ballground Rd to Crystal Springs Trail (approximately 0.5 miles) and a westbound truck passing lane starting just past Crystal Springs Trail and continuing past the end of the project to Greenwood Court (approximately 1.0 mile). Major intersections along the project include E Cherokee Dr, entrance to Kroger Shopping Center, and SR 369. Existing traffic signals are at the intersections with E Cherokee Dr. and the entrance to the Kroger Shopping Center. There are sidewalks in front of the Kroger Shopping Center near East Cherokee Drive and a quadruple box culvert at Smithwick Creek near Crystal Springs Trail.

County: Cherokee

Other projects in the area:

PI 0014131 – SR 20 FROM CR 281/SCOTT ROAD TO CR 762/UNION HILL ROAD
 PI 0014132 – SR 20 FROM CR 762/UNION HILL RD TO CR 765/EAST CHEROKEE DR
 PI 0002862 – SR 20 FROM SR 369/CHEROKEE TO SR 371/FORSYTH
 PI 0003682 – SR 20 FROM SR 371 TO N CORNERS PKWY (West side of Cumming)
 PI 0009164 – SR 20 FM 0.34 MI E OF I-575 TO 0.15 E OF CR 281/SCOTT RD

MPO: Atlanta TMA**TIP #:** CH-020B**Congressional District(s):** 11**Federal Oversight:** ☐ PoDI ☐ Exempt ☒ State Funded ☐ Other**Projected Traffic:** ADT 24 HR T: 16 %

Current Year (2011): 14,350 Open Year (2025): 21,000 Design Year (2045): 37,600

Traffic Projections Performed by: GCA, Inc.

Date approved by the GDOT Office of Planning: 5/20/14

Functional Classification (Mainline): Rural Principal Arterial**Complete Streets - Bicycle, Pedestrian, and/or Transit Standard Warrants:**Warrants met: ☐ None ☒ Bicycle ☒ Pedestrian ☐ Transit

Cherokee County has a planned multi-use trail running from Cherokee Veterans Park to Smithwick Creek and the trail will be incorporated into this project. Sidewalks will be provided throughout the project.

Is this a 3R (Resurfacing, Restoration, & Rehabilitation) Project? ☒ No ☐ Yes**Pavement Evaluation and Recommendations**

Initial Pavement Evaluation Summary Report Required? ☐ No ☒ Yes
 Initial Pavement Type Selection Report Required? ☐ No ☒ Yes
 Feasible Pavement Alternatives: ☐ HMA ☐ PCC ☒ HMA & PCC

DESIGN AND STRUCTURAL

Description of the proposed project: PI 0014133 is the widening and reconstruction of SR 20 in Cherokee County from east of East Cherokee Dr to east of SR 369 to six lanes (three lanes in each direction) with a 20 foot raised median and urban shoulders. A multi-use path will take the place of the sidewalk on the north side of the road from Cherokee Veterans Park to Smithwick Creek (400 ft before Crystal Springs Trail). Access to side roads and driveways will be controlled by Restricted Crossing U-Turns (RCUTs) placed in the median; RCUT locations are shown in the layouts but may change based on preliminary design. Truck turnarounds are provided at certain RCUT locations based on consideration of adjacent facilities that may draw tractor trailers (factories, farms with chicken houses, landscaping or stone supply companies, etc). The project resides within an MS4 area and on/near a ridgeline, which places almost all drainage areas near receiving stream headwaters having less than 5 mi² of drainage areas. To satisfy the requirements of the downstream hydrologic assessment (See section 10.2.1.1 of the 2016 Drainage Manual) the project proposes to capture all pavement runoff through use of curb and gutter (urban shoulder) into a closed drainage system, which would pipe roadway runoff to permanent post-construction stormwater dry detention basins to treat for water quality as well as to detain and provide protection from downstream flooding. The total project length is about 2.1 miles.

County: Cherokee

This project begins where PI 0014132 ends with the E Cherokee Dr intersection being constructed with PI 0014132 and ends where PI 0002862 begins with the SR 369 intersection being constructed with PI 0014133.

Major Structures:

Structure	Existing	Proposed
Quadruple Box Culvert over Smithwick Creek	Type: Concrete No. Barrels: 1 Width: 10 ft Height: 9 ft Length: 76 ft Sufficiency Rating: 93.80	Extend culvert

Mainline Design Features:

Typical Section: 6-lane urban, 11 & 12 ft wide travel lanes, 20' raised median, curb & gutter – Begin Project to Smithwick Creek

Feature	Existing	Policy	Proposed
Typical Section:			
- Number of Lanes	2		6
- Lane Width(s)	12 ft	11 ft-12 ft	11 ft (inside & middle) 12 ft (outside)
- Median Width & Type	N/A	Varies	20 ft Raised
- Border Area Width	N/A	10 ft - 16 ft	16 ft
- Outside Shoulder Slope	Varies	2%	2%
- Inside Shoulder Width	N/A	C&G	C&G
- Sidewalks	N/A	5 ft	5 ft
- Auxiliary Lanes	N/A		N/A
- Bike Accommodation	N/A	Various Options	Multi-Use Trail
Posted Speed	45 mph		45 mph
Design Speed	Unknown	45 mph	45 mph
Minimum Horizontal Curve Radius	Unknown	711	711
Maximum Superelevation Rate	Unknown	4%	4%
Maximum Grade	Unknown	7%	7%
Access Control	Unknown		Permitted
Design Vehicle	Unknown		WB-67
Pavement Type	Asphalt		TBD

*According to current GDOT design policy if applicable

County: Cherokee

Typical Section: 6-lane urban, 11 & 12 ft wide travel lanes, 20' raised median, curb & gutter –
Smithwick Creek to End Project

Feature	Existing	Policy	Proposed
Typical Section:			
- Number of Lanes	2		6
- Lane Width(s)	12 ft	11 ft-12 ft	11 ft (inside & middle) 12 ft (outside)
- Median Width & Type	N/A	Varies	20 ft Raised
- Border Area Width	N/A	10 ft - 16 ft	16 ft
- Outside Shoulder Slope	Varies	2%	2%
- Inside Shoulder Width	N/A	C&G	C&G
- Sidewalks	N/A	5 ft	5 ft
- Auxiliary Lanes	N/A		N/A
- Bike Accommodation	N/A	N/A	N/A
Posted Speed	45 mph		45 mph
Design Speed	Unknown	45 mph	45 mph
Minimum Horizontal Curve Radius	Unknown	711	711
Maximum Superelevation Rate	Unknown	4%	4%
Maximum Grade	Unknown	7%	7%
Access Control	Unknown		Permitted
Design Vehicle	Unknown		WB-67
Pavement Type	Asphalt		TBD

*According to current GDOT design policy if applicable

Major Interchanges/Intersections: SR 369

Lighting required: ☒ No ☐ Yes

Off-site Detours Anticipated: ☒ No, for mainline ☒ Undetermined, for side roads ☐ Yes

Transportation Management Plan [TMP] Required: ☒ No ☐ Yes
 If Yes: Project classified as: ☐ Non-Significant ☐ Significant
 TMP Components Anticipated: ☐ TTC ☐ TO ☐ PI

Note: TMP is not required because project is state funded.

Is the project located on a NHS roadway? ☐ No ☒ Yes

County: Cherokee

Design Exceptions/Design Variances to FHWA or GDOT Controlling Criteria anticipated:

FHWA or GDOT Controlling Criteria	No	Undeter- mined	Yes	DE or DV	Approval Date (if applicable)
1. Design Speed	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
2. Design Loading Structural Capacity	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
3. Stopping Sight Distance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
4. Horizontal Curve Radius	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
5. Maximum Grade	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
6. Vertical Clearance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
7. Superelevation Rate	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
8. Lane Width	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
9. Cross Slope	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
10. Shoulder Width	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

Design Variances to GDOT Standard Criteria anticipated:

GDOT Standard Criteria	Reviewing Office	No	Undeter- mined	Yes	Approval Date (if applicable)
1. Access Control	DP&S	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Shoulder Width	DP&S	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Intersection Sight Distance	DP&S	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. Intersection Skew Angle	DP&S	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. Tangent Lengths on Reverse Curves	DP&S	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6. Lateral Offset to Obstruction	DP&S	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7. Rumble Strips	DP&S	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8. Safety Edge	DP&S	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9. Median Usage	DP&S	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
10. Roundabout Illumination Levels	DP&S	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
11. Complete Streets Warrants	DP&S	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
12. ADA Requirements in PROWAG	DP&S	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
13. GDOT Construction Standards	DP&S	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
14. GDOT Drainage Manual	DP&S	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
15. GDOT Bridge & Structural Manual	Bridges	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

VE Study anticipated: ☐ No ☐ Yes ☒ Completed – Date: 3/2/2017

See attachments for VE Implementation Letter.

UTILITY AND PROPERTY

Railroad Involvement: No railroads are in the vicinity of the project.

Utility Involvements:

AGL – Natural Gas

Cherokee County - Water

Comcast

Georgia Power – Distribution Power

Sawnee EMC – Distribution Power

Sunesys – Telecom

Windstream - Telecom

County: Cherokee

SUE Required: ☐ No ☒ Yes ☐ Undetermined**Public Interest Determination Policy and Procedure recommended?** ☒ No ☐ Yes**Right-of-Way (ROW):** Existing width: 80-150ft. Proposed width: 150+ft.Required Right-of-Way anticipated: ☐ None ☒ Yes ☐ UndeterminedEasements anticipated: ☐ None ☒ Temporary ☒ Permanent ☒ Utility ☐ Other

Anticipated total number of impacted parcels:	<u>102</u>
Displacements anticipated:	Businesses: <u>6</u>
	Residences: <u>19</u>
	Other: <u>0</u>
Total Displacements:	<u>25</u>

Location and Design approval: ☐ Not Required ☒ Required**Impacts to USACE property anticipated?** ☒ No ☐ Yes ☐ Undetermined**Is Federal Aviation Administration (FAA) coordination anticipated?** ☒ No ☐ Yes

ROUNDABOUTS

Per email from the Office of Traffic Operations received 8/30/16, roundabouts do not need to be considered on six-lane roadways (see Attachment 6).

CONTEXT SENSITIVE SOLUTIONS

Issues of Concern:

Potential impacts that may require context-sensitive solutions along this project corridor include the following:

- Historic properties
- Streams and wetlands
- Residences and businesses

Impacts to these resources will be minimized by techniques such as utilizing steeper slopes, walls, and coordinating with the agencies for optimal design solutions. We have also reduced the lane width of four of the lanes to 11 feet from 12 feet.

In addition, meetings have been held with the City of Canton and Cherokee County to determine the appropriate design for this corridor. Five rounds of PIOHs have been held to understand the needs of the general public and to develop and present the current concept layout. We will incorporate design elements to meet these needs as appropriate.

Context Sensitive Solutions Proposed:

Alignment shifts (e.g., widening to the north, south, and symmetrical) will be utilized to minimize impacts to historic properties, streams/wetlands, residences, and businesses. In addition, narrower shoulders, steeper slopes, and the use of retaining walls will be considered to further reduce the footprint and impacts of the proposed improvements. A 10 foot wide multi-purpose bath will be used in place of the sidewalk on the north side of the road from Cherokee Veterans Park to Smithwick Creek (400 ft before Crystal Springs Trail). Due to the safety concerns along the corridor, restricted crossing u-turn medians are proposed at frequent intervals along the corridor, which allow for passenger car and tractor trailer turn arounds and reduce the number of conflict points for the vehicles as compared to a full access median. Access to all parcels will be maintained throughout construction.

County: Cherokee

ENVIRONMENTAL & PERMITS

Anticipated Environmental Document:

NEPA: ☐ PCE ☐ CE ☐ EA-FONSI ☐ EIS
 GEPA*: ☐ Type A ☐ Type B ☐ EER ☒ None

*A GEPA document must be prepared only for state funded projects where the project cost meets or exceeds \$100 million.

Level of Environmental Analysis:

- ☐ The environmental considerations noted below are based on preliminary desktop or screening level environmental analysis and are subject to revision after the completion of resource identification, delineation, and agency concurrence.
- ☒ The environmental considerations noted below are based on the completion of resource identification, delineation, and agency concurrence.

Water Quality Requirements:

MS4 Permit Compliance – Is the project located in a MS4 area? ☐ No ☒ Yes

Post-construction stormwater management with permanent practices and structures put in place to reduce, treat, or minimize stormwater pollution from stabilized, developed areas, are being considered and will be incorporated in the plans as needed. There is no project level exclusion that applies to this project.

Is Protected Species water quality mitigation anticipated? ☒ Yes ☐ No

Environmental Permits/Variations/Commitments/Coordination anticipated:

Permit/ Variance/ Commitment/ Coordination Anticipated	No	Yes	Remarks
1. U.S. Coast Guard Permit	X		
2. Forest Service/NPS	X		
3. CWA Section 404 Permit		X	404 Permit will be evaluated on a corridor basis.
4. Tennessee Valley Authority Permit	X		
5. 33 USC 408 Decision	x		
6. Buffer Variance		X	Buffer variance will be evaluated on a corridor basis.
7. Coastal Zone Management Coordination	X		
8. NPDES		X	
9. FEMA	X		FEMA coordination will be evaluated on a corridor basis.
10. Cemetery Permit	X		
11. Other Permits	X		
12. Other Commitments		X	Special Provisions for protection of bats and darters anticipated
13. Other Coordination	x		

Is a PAR required? ☐ No ☒ Yes ☐ Completed – Date:

The Screen 2 Memo is being converted into a PAR document by using supplemental information. This process is ongoing as of the writing of this report.

County: Cherokee

Environmental Comments and Information:

NEPA/GEPA: The project is being advanced under GEPA as a state funded project with the lead agency as the U.S. Army Corps of Engineers (USACE).

Ecology: The 2016 ecological field survey identified 12 features including 3 upland drainage features and 9 jurisdictional features, including 3 intermittent streams, 5 perennial streams, and 1 wetland. Features are inclusive to each PI number. A 404 Permit and a Stream Buffer Variance will be required.

History: The 2015 SHPO concurred with Historic Resource Survey Report identified 3 National Register-eligible properties. SHPO concurrence was received in 2015. Macedonia Funeral Home and Cemetery nor home plots containing family cemeteries scattered throughout the corridor would not be impacted by the project.

Archeology: The archaeology field work is underway and no National Register eligible sites have been identified to date within these limits.

Air Quality:

Is the project located in an Ozone Non-attainment area?

☐ No☒ Yes

Is a Carbon Monoxide hotspot analysis required?

☐ No☒ Yes

A Carbon Monoxide hotspot analysis is required for the project corridor as the corridor contains at least one traffic signal, design year traffic volumes exceed 10,000 vpd, and the level of service is D, E or F.

Noise Effects: No noise study is required for the corridor as it is a state funded project. Noise studies will be completed for National Register Eligible historic properties.

Public Involvement: Five Public Involvement Open Houses (PIOH) were held: PIOH #1 (Scoping Mtg) on May 16, 2013 and May 21, 2013; PIOH #2 on December 10, 2013 and December 12, 2013; PIOH #3 on September 15, 2015 and September 17, 2015; and PIOH #4 on December 6, 2016 and December 15, 2016; PIOH #5 on May 8 and 16, 2017. Each public meeting was held in Canton and Cumming for the convenience of attendees. In addition, a Citizen's Advisory Committee and a Technical Advisory Committee were formed early in the project development to inform the alternatives evaluation.

Major stakeholders: Major stakeholders include the traveling public (local users and cross-county users), homeowners, business associations located on SR 20 and in the vicinity of the roadway project, and agencies/stakeholders with interest in the resources located along the corridor.

CONSTRUCTION

Issues potentially affecting constructability/construction schedule:

Due to the presence of protected bats along the corridor, there may be clearing restrictions; however, this is an ongoing co-ordination issue with resource agencies that will be determined through the GEPA process.

Due to the width of the proposed improvements, we anticipate maintaining traffic on the current corridor while constructing the improvements. It will require multiple stages to widen and shift traffic through completion of all improvements.

Early Completion Incentives recommended for consideration: ☒ No

☐ Yes

County: Cherokee

COORDINATION, ACTIVITIES, RESPONSIBILITIES, AND COSTS

Initial Concept Meeting: The initial concept meetings were held on March 5, 2013 (District 1) and March 6, 2013 (District 6); meeting minutes are attached.

Concept Meeting: The concept meeting was held on March 10, 2017; meeting minutes are attached.

Other coordination to date: See Public Involvement section.

Project Activity	Party Responsible for Performing Task(s)
Concept Development	AECOM
Design	AECOM
Right-of-Way Acquisition	GDOT
Utility Coordination (Preconstruction)	GDOT, AECOM
Utility Relocation (Construction)	Utility Owner, Contractor
Letting to Contract	GDOT
Construction Supervision	GDOT
Providing Material Pits	Contractor
Providing Detours	Contractor
Environmental Studies, Documents, & Permits	AECOM
Environmental Mitigation	GDOT
Construction Inspection & Materials Testing	GDOT

Project Cost Estimate Summary and Funding Responsibilities:

	PE Activities		ROW	Reimbursable Utilities	CST*	Total Cost
	PE Funding	Section 404 Mitigation				
Funded By	GDOT	GDOT	GDOT	GDOT	GDOT	
\$ Amount	\$2,116,112**	\$104,026***	\$12,801,000	\$2,425,000	\$24,036,473	\$41,482,611
Date of Estimate	12/15/15	8/31/17	5/31/17	2/22/17	8/24/17	

*CST Cost includes: Construction, Engineering and Inspection, Contingencies and Liquid AC Cost Adjustment.

**Total PE funding for PI 0003681 (which includes PIs 0009164, 0014131, 0014132, 0014133, 0002862, and 0003682) is \$20,153,451. The funding for this project was estimated based on the percentage this project makes up of the entire corridor.

***Total estimated mitigation cost (excluding buffer impacts) for the entire corridor (including PIs 0014131, 0014132, 0014133, 0002862, and 0003682) is \$931,280. The cost for this project was estimated based on the percentage this project makes up of the entire corridor.

County: Cherokee

ALTERNATIVES DISCUSSION

Alternative selection:

Preferred Alternative: The proposed alignment will generally follow the existing roadway from E Cherokee Dr. to SR 369. Corrections to the horizontal and vertical alignment along that section were made to meet the design criteria and to minimize impacts to residents, businesses, historic properties, streams, and wetlands.			
Estimated Property Impacts:	102 parcels, 25 displacements	Estimated Total Cost:	\$41,482,611
Estimated ROW Cost:	\$12,801,000	Estimated CST Time:	24 months
Rationale: This alternative was chosen because it meets the goals outlined in the project justification statement. It is the best-fit in terms of avoidance of displacements, streams, wetlands, and historic properties.			

No-Build Alternative: No improvements to SR 20.			
Estimated Property Impacts:	0 parcels, 0 displacements	Estimated Total Cost:	\$0
Estimated ROW Cost:	\$0	Estimated CST Time:	0 months
Rationale: This alternative fails to address the need and purpose of the project.			

Alternative 1: This alternative (shown as Conceptual Alternatives 3A and 3B in Attachment 10) would construct a new, limited access facility to the north or south of existing SR 20.

Impacts: See Attachment 10 for detailed cost and impact analysis.

Rationale: This alternative was evaluated in the Screen 2 analysis. This alternative is not recommended to advance for further evaluation, as it is almost twice as expensive as the preferred alternative.

Alternative 2: This alternative (shown as Conceptual Alternative 4 in Attachment 10) would go off the existing SR 20 and implement a localized bypass, tying back in to existing at the beginning and end of the project.

Impacts: See Attachment 10 for detailed cost and impact analysis.

Rationale: This alternative was evaluated in the Screen 2 analysis. This alternative would have a similar construction cost to the preferred alternative and similar impacts to residents, businesses, historic properties, streams and wetlands. At the PIOHs, we heard that the public would prefer to widen existing rather than impact the surrounding communities with bypasses. Therefore, with state funding for the project, widening existing was selected as the preferred alternative.

County: Cherokee

LIST OF ATTACHMENTS/SUPPORTING DATA

1. Concept Layout
2. Typical sections
3. Detailed Cost Estimates:
 - a. Construction including Engineering and Inspection and Contingencies
 - b. Completed Liquid AC Cost Adjustment forms
 - c. Right-of-Way
 - d. Utilities
 - e. Environmental Mitigation
4. Traffic study
5. Traffic diagrams
6. Roundabout Data
7. S I & A Report
8. Minutes of Concept meetings
9. Minutes of any meetings that shows support or objection to the concept
10. Screen 2 Conceptual Alternatives
 - a. Map
 - b. Displacements
 - c. Costs
 - d. Comprehensive Matrix
11. VE Implementation Letter

APPROVALS

Concur: _____

Heidi Bittel

Director of Engineering

Approve: _____

Margaret B. Pirelo

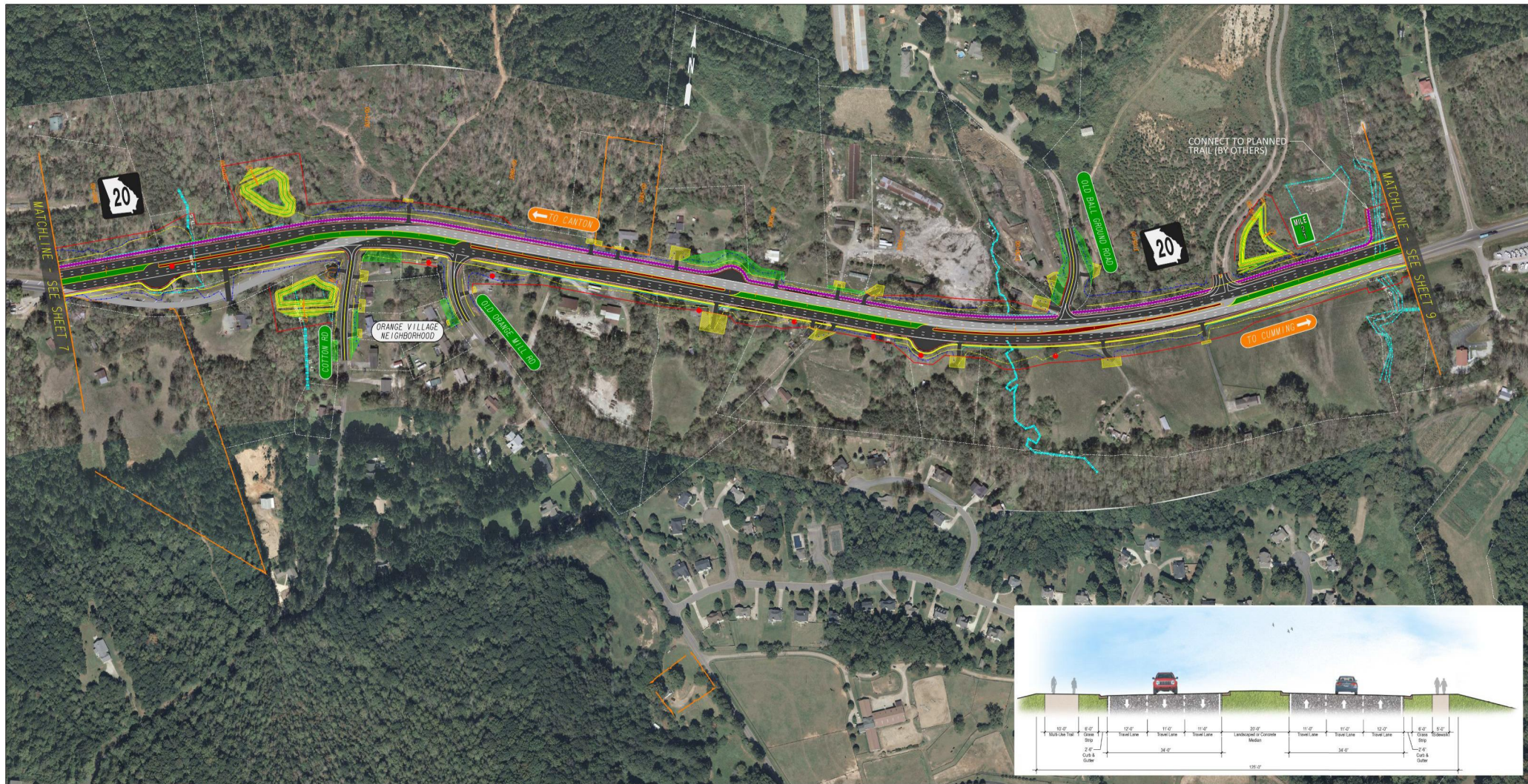
Chief Engineer

11/9/17

Date

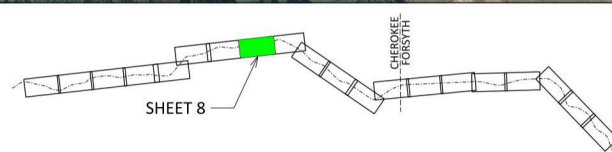
Attachment 1

Concept Layout



LEGEND

- | | | |
|-----------------------------|-------------------|-----------------------------------|
| HISTORIC RESOURCES | LIMITS | GUARDRAIL |
| STREAMS/WETLANDS | EXISTING PAVEMENT | CHURCH |
| REQUIRED RIGHT-OF-WAY (R/W) | PROPOSED PAVEMENT | EXISTING TRAFFIC SIGNAL |
| DRIVEWAY EASEMENT | PAVED MEDIAN | PROPOSED TRAFFIC SIGNAL |
| PERMANENT EASEMENT | GRASSED MEDIAN | (PENDING SIGNAL WARRANT APPROVAL) |
| POTENTIAL DISPLACEMENT | CURB AND GUTTER | POTENTIAL POND |
| EXIST. PROPERTY & R/W | SIDEWALK | PROPOSED MULTI-USE TRAIL |
| | WALL/BARRIER | |



Georgia Department of Transportation

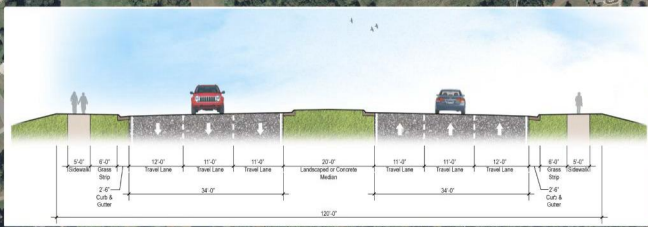
AECOM

SR20
IMPROVEMENTS
CANTON TO CUMMING

SR 20 - CORRIDOR IMPROVEMENTS
PROPOSED ALIGNMENT

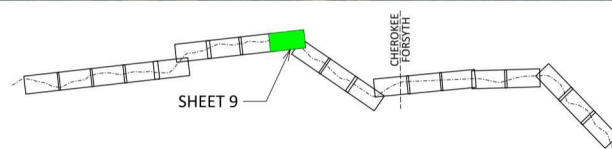
SCALE IN FEET
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SHEET 8



LEGEND

- | | | |
|-----------------------------|-------------------|---|
| HISTORIC RESOURCES | LIMITS | CHURCH |
| STREAMS/WETLANDS | EXISTING PAVEMENT | EXISTING TRAFFIC SIGNAL |
| REQUIRED RIGHT-OF-WAY (R/W) | PROPOSED PAVEMENT | PROPOSED TRAFFIC SIGNAL (PENDING SIGNAL WARRANT APPROVAL) |
| DRIVEWAY EASEMENT | PAVED MEDIAN | POTENTIAL POND |
| PERMANENT EASEMENT | GRASSED MEDIAN | |
| POTENTIAL DISPLACEMENT | CURB AND GUTTER | |
| EXIST. PROPERTY & R/W | SIDEWALK | |
| | WALL/BARRIER | |



Georgia Department of Transportation

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SR20
IMPROVEMENTS
CANTON TO CUMMING

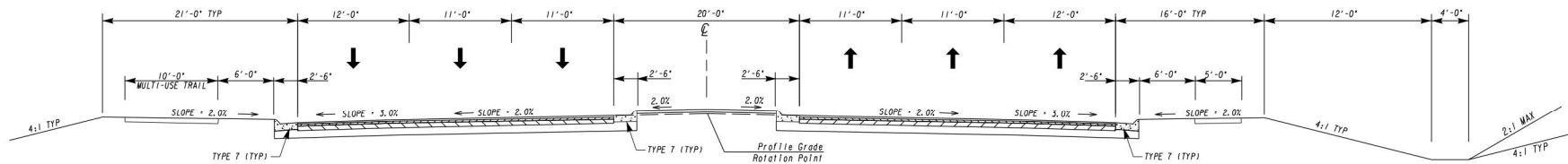
SR 20 - CORRIDOR IMPROVEMENTS
PROPOSED ALIGNMENT

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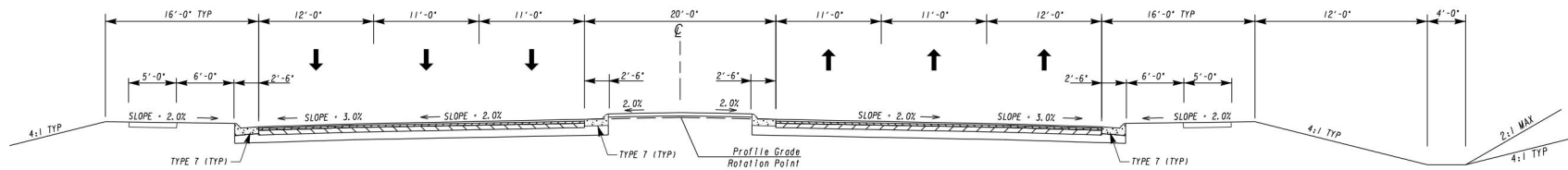
SHEET 9

Attachment 2

Typical Sections



6 LANE, 20' RAISED MEDIAN WITH TRAIL (LEFT)
BEGIN TO STA 3114+00



6 LANE, 20' RAISED MEDIAN
STA 3114+00 TO END

AECOM

NOT TO SCALE

REVISION DATES

TYPICAL SECTIONS

CHECKED:		DATE:		DRAWING No.
BACKCHECKED:		DATE:		
CORRECTED:		DATE:		
VERIFIED:		DATE:		

05-001

Attachment 3

Detailed Cost Estimates

DEPARTMENT OF TRANSPORTATION STATE OF GEORGIA

INTERDEPARTMENT CORRESPONDENCE

FILE P.I. No. **0014133** **OFFICE** Program Delivery

PROJECT DESCRIPTION
Widening of SR 20 from CR 765/East Cherokee Dr to SR 369

DATE August 24, 2017

From: Albert V. Shelby, State Program Delivery Engineer

To: Lisa L. Myers, State Project Review Engineer
via Email Mailbox: CostEstimatesandUpdates@dot.ga.gov

Subject: REVISIONS TO PROGRAMMED COSTS

PROJECT MANAGER Cleopatra James

MGMT LET DATE 7/15/2019

MGMT ROW DATE 7/17/2017

PROGRAMMED COSTS (TPro W/OUT INFLATION)

LAST ESTIMATE UPDATE

CONSTRUCTION \$ 13,230,000.00

DATE 9/2/2016

RIGHT OF WAY \$ 12,883,050.00

DATE 9/2/2016

UTILITIES \$ TBD

DATE N/A

REVISED COST ESTIMATES

CONSTRUCTION* \$ 24,036,473.13

RIGHT OF WAY \$ 12,801,000.00

UTILITIES \$ 2,425,000.00

*Cost Contains **5** % Contingency

REASONS FOR COST INCREASE AND CONTINGENCY JUSTIFICATION:

The increase in construction costs was due to the previous estimate being based on 4 lanes instead of 6 lanes, rural shoulders instead of urban shoulders, open systems instead of closed drainage systems, and the addition of full depth paving and MS4 basins. A 5% contingency was added to the Construction estimate for risk. At the time of the last update, Utilities information was not available and the current estimate is based on the best available information at the current stage. The ROW cost increase is based on a more thorough review of the current plans.

CONTINGENCY SUMMARY

A. CONSTRUCTION COST ESTIMATE:	\$ 20,984,847.50	Base Estimate From CES	
B. ENGINEERING AND INSPECTION (E & I):	\$ 1,049,242.38	Base Estimate (A) x	5 %
C. CONTINGENCY:	\$ 1,101,704.49	Base Estimate (A) + E & I (B) x	5 %
		See % Table in "Risk Based Cost Estimation" Memo	
D. TOTAL LIQUID AC ADJUSTMENT:	\$ 900,678.76	Total From Liquid AC Spreadsheet	
E. CONSTRUCTION TOTAL:	\$ 24,036,473.13	(A + B + C + D = E)	

REIMBURSABLE UTILITY COSTS

UTILITY OWNER	REIMBURSABLE COST
TOTAL	\$ -

ATTACHMENTS: (File Copy in the Project Cost Estimate Folder)

Detailed Cost Estimate Printout
Liquid AC Adjustment Spreadsheet

PROJ. NO. N/A
P.I. NO. 0014133
DATE 8/24/2017

CALL NO. 0/00/2016

INDEX (TYPE)	DATE	INDEX
REG. UNLEADED	Aug-17	\$ 2.185
DIESEL		\$ 2.077
LIQUID AC		\$ 361.00

Link to AC Index:
<http://www.dot.ga.gov/PS/Materials/AsphaltFuelIndex>

LIQUID AC ADJUSTMENTS

PA=[((APM-APL)/APL)]xTMTxAPL

Asphalt

Price Adjustment (PA)					877197.51	\$	877,197.51
Monthly Asphalt Cement Price month placed (APM)	Max. Cap	60%	\$	577.60			
Monthly Asphalt Cement Price month project let (APL)			\$	361.00			
Total Monthly Tonnage of asphalt cement (TMT)				4049.85			

ASPHALT	Tons	%AC	AC ton
Leveling	2000	5.0%	100
12.5 OGFC		5.0%	0
12.5 mm	11421	5.0%	571.05
9.5 mm SP		5.0%	0
25 mm SP	53083	5.0%	2654.15
19 mm SP	14493	5.0%	724.65
	80997		4049.85

BITUMINOUS TACK COAT

Price Adjustment (PA)					\$ 23,481.25	\$	23,481.25
Monthly Asphalt Cement Price month placed (APM)	Max. Cap	60%	\$	577.60			
Monthly Asphalt Cement Price month project let (APL)			\$	361.00			
Total Monthly Tonnage of asphalt cement (TMT)				108.4083473			

Bitum Tack

Gals	gals/ton	tons
25240	232.8234	108.408347

BITUMINOUS TACK COAT (surface treatment)

Price Adjustment (PA)					0	\$	-
Monthly Asphalt Cement Price month placed (APM)	Max. Cap	60%	\$	577.60			
Monthly Asphalt Cement Price month project let (APL)			\$	361.00			
Total Monthly Tonnage of asphalt cement (TMT)				0			

Bitum Tack	SY	Gals/SY	Gals	gals/ton	tons
Single Surf. Trmt.		0.20	0	232.8234	0
Double Surf. Trmt.		0.44	0	232.8234	0
Triple Surf. Trmt		0.71	0	232.8234	0
					0

TOTAL LIQUID AC ADJUSTMENT \$ 900,678.76

0014133 CES 170818.txt
STATE HIGHWAY AGENCY

DATE : 08/18/2017
PAGE : 1

JOB ESTIMATE REPORT

JOB NUMBER : 0014133 SPEC YEAR: 13
DESCRIPTION: SR 20 FROM CR 765/EAST CHEROKEE DR TO SR 369

ITEMS FOR JOB 0014133

LINE	ITEM	ALT	UNITS	DESCRIPTION	QUANTITY	PRICE	AMOUNT
0004	150-1000		LS	TRAFFIC CONTROL - 0014133	1.000	1500000.00	1500000.00
0005	150-5010		EA	TRAF CTRL,PORTABLE IMPACT ATTN	26.000	7811.78	203106.43
0010	153-1300		EA	FIELD ENGINEERS OFFICE TP 3	1.000	95413.10	95413.10
0018	201-1500		LS	CLEARING & GRUBBING - 0014133	1.000	1817920.00	1817920.00
0019	205-0001		CY	UNCLASS EXCAV	167572.000	7.18	1203456.86
0022	206-0002		CY	BORROW EXCAV, INCL MATL	25000.000	7.25	181496.75
0043	310-1101		TN	GR AGGR BASE CRS, INCL MATL	130272.000	21.61	2816167.99
0044	402-3121		TN	RECYL AC 25MM SP,GP1/2,BM&HL	53083.000	80.00	4246640.00
0049	402-3130		TN	RECYL AC 12.5MM SP,GP2,BM&HL	11421.000	80.00	913680.00
0054	402-3190		TN	RECYL AC 19 MM SP,GP 1 OR 2 ,INC BM&HL	14493.000	80.00	1159440.00
0056	402-1812		TN	RECYL AC LEVELING,INC BM&HL	2000.000	80.00	160000.00
0057	413-0750		GL	TACK COAT	25240.000	2.57	64866.80
0059	441-0016		SY	DRIVEWAY CONCRETE, 6 IN TK	1703.000	38.87	66196.46
0064	441-0018		SY	DRIVEWAY CONCRETE, 8 IN TK	1212.000	49.17	59606.00
0069	441-0104		SY	CONC SIDEWALK, 4 IN	14410.000	29.76	428862.21
0073	441-0204		SY	PLAIN CONC DITCH PAVING, 4 IN	2500.000	34.52	86320.48
0074	441-0740		SY	CONC MEDIAN, 4 IN	14471.000	22.64	327656.29
0079	441-4020		SY	CONC VALLEY GUTTER, 6 IN	370.000	40.67	15049.84
0088	441-6740		LF	CONC CURB & GUTTER/ 8X30 TP7	58564.000	12.37	724736.53
0089	620-0100		LF	TEMP BARRIER, METHOD NO. 1	16000.000	24.63	394116.16
0092	621-4060		LF	CONCRETE SIDE BARRIER, TY 6	500.000	240.00	120000.00
0093	621-4061		LF	CONCRETE SIDE BARRIER, TY 6A	500.000	257.28	128640.00
0094	621-4062		LF	CONCRETE SIDE BARRIER, TY 6B	533.000	240.00	127920.00
0098	626-0602		LF	TRAFFIC BARRIER, H	954.000	150.00	143100.00
0099	627-1020		SF	MSE WALL FACE, 20 - 30 FT HT, WALL NO - 0014133	13530.000	46.49	629106.03
0104	627-1030		SF	MSE WALL FACE, GTR 30 FT HT, WALL NO - 0014133	10200.000	46.09	470172.47
0109	634-1200		EA	RIGHT OF WAY MARKERS	285.000	107.40	30609.38
0114	643-8200		LF	BARRIER FENCE (ORANGE), 4 FT	5250.000	1.63	8609.95
0119	500-3101		CY	CLASS A CONCRETE	731.000	567.05	414514.87
0124	511-1000		LB	BAR REINF STEEL	78844.000	0.79	62928.55
0129	550-1180		LF	STM DR PIPE 18,H 1-10	10000.000	38.13	381325.80
0134	550-1240		LF	STM DR PIPE 24,H 1-10	90.000	63.71	5734.40
0139	550-1360		LF	STM DR PIPE 36,H 1-10	656.000	72.10	47303.71
0144	550-2180		LF	SIDE DR PIPE 18,H 1-10	5200.000	28.03	145799.89
0149	550-3318		EA	SAFETY END SECTION 18,STD,4:1	6.000	670.23	4021.42
0154	550-3324		EA	SAFETY END SECTION 24,STD,4:1	2.000	910.60	1821.21
0159	550-3336		EA	SAFETY END SECTION 36,STD,4:1	5.000	2416.56	12082.80
0164	550-3418		EA	SAFETY END SECTION 18,SD,4:1	104.000	325.18	33819.41
0169	600-0001		CY	FLOWABLE FILL	40.000	235.85	9434.03

0174	668-1100	EA	CATCH BASIN, GP 1	50.000	2391.99	119599.56
0179	668-1110	LF	CATCH BASIN, GP 1, ADDL DEPTH	165.000	199.60	32934.37

STATE HIGHWAY AGENCY

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JOB ESTIMATE REPORT

0184	668-2100	EA	DROP INLET, GP 1	20.000	2321.62	46432.56
0189	668-2110	LF	DROP INLET, GP 1, ADDL DEPTH	66.000	196.49	12968.71
0194	668-4300	EA	STORM SEW MANHOLE, TP 1	1.000	2194.01	2194.02
0199	668-4311	LF	ST SEW MANHOLE,TP 1,A DEP,CL 1	8.000	209.92	1679.39
0204	163-0232	AC	TEMPORARY GRASSING	22.000	698.42	15365.37
0209	163-0240	TN	MULCH	841.000	166.79	140273.87
0214	163-0300	EA	CONSTRUCTION EXIT	14.000	1351.37	18919.21
0219	163-0501	EA	CONSTR AND REMOVE SILT CONTROL GATE,TP 1	4.000	622.92	2491.70
0224	163-0503	EA	CONSTR AND REMOVE SILT CONTROL GATE,TP 3	52.000	379.70	19744.57
0229	163-0520	LF	CONSTR AND REMOVE TEMP PIPE SLOPE DRAIN	1500.000	13.84	20770.83
0234	163-0527	EA	CNST/REM RIP RAP CKDM,STN P RIPRAP/SN BG	183.000	309.26	56594.89
0239	163-0531	EA	CONSTR & REM SEDIMENT BASIN,TP 1,STA NO- 5 LOCATIONS	5.000	13732.28	68661.43
0244	163-0550	EA	CONS & REM INLET SEDIMENT TRAP	71.000	141.95	10078.55
0249	165-0030	LF	MAINT OF TEMP SILT FENCE, TP C	19000.000	0.60	11451.49
0254	165-0041	LF	MAINT OF CHECK DAMS - ALL TYPES	1830.000	2.88	5279.26
0259	165-0060	EA	MAINT OF TEMP SEDIMENT BASIN,STA NO -	5.000	1361.34	6806.71
0264	165-0085	EA	MAINT OF SILT CONTROL GATE, TP 1	4.000	137.79	551.17
0269	165-0087	EA	MAINT OF SILT CONTROL GATE, TP 3	52.000	56.40	2932.95
0274	165-0101	EA	MAINT OF CONST EXIT	14.000	586.35	8208.96
0279	165-0105	EA	MAINT OF INLET SEDIMENT TRAP	71.000	53.43	3793.91
0284	167-1000	EA	WATER QUALITY MONITORING AND SAMPLING	9.000	400.10	3600.92
0289	167-1500	MO	WATER QUALITY INSPECTIONS	24.000	456.63	10959.23
0294	171-0030	LF	TEMPORARY SILT FENCE, TYPE C	38000.000	3.18	120917.52
0299	603-2181	SY	STN DUMPED RIP RAP, TP 3, 18	160.000	48.36	7738.50
0304	603-7000	SY	PLASTIC FILTER FABRIC	160.000	4.70	752.26
0309	643-8200	LF	BARRIER FENCE (ORANGE), 4 FT	5250.000	1.63	8609.95
0314	700-6910	AC	PERMANENT GRASSING	44.000	1039.82	45752.25
0319	700-7000	TN	AGRICULTURAL LIME	193.000	102.42	19767.69
0324	700-8000	TN	FERTILIZER MIXED GRADE	52.000	532.63	27696.83
0329	700-8100	LB	FERTILIZER NITROGEN CONTENT	2210.000	2.20	4876.14
0334	710-9000	SY	PERM SOIL REINFORCING MAT	2500.000	3.66	9150.00
0339	716-2000	SY	EROSION CONTROL MATS, SLOPES	13700.000	0.97	13365.17
0349	636-1033	SF	HWY SIGNS, TP1MAT,REFL SH TP 9	300.000	19.25	5775.08
0354	636-1036	SF	HWY SGN,TP1MAT,REFL SH TP 11	1141.000	21.41	24428.81
0359	636-1072	SF	HWY SIGNS,ALUM EXTRD PNLS, RS TP 3	154.000	25.54	3934.09
0364	636-2070	LF	GALV STEEL POSTS, TP 7	263.000	8.42	2215.99
0369	639-2002	LF	STEEL WIRE STRAND CABLE, 3/8	112.000	10.91	1222.32
0374	636-3000	LB	GALV STEEL STR SHAPE POST	1026.000	5.27	5407.02
0379	639-4003	EA	STRAIN POLE, TP IIII	5.000	7080.45	35402.26
0381	641-1100	LF	GUARDRAIL, TP T	44.000	75.74	3332.97
0382	641-1200	LF	GUARDRAIL, TP W	5989.000	17.73	106187.07

				0014133 CES 170818.txt			
0383	641-5001	EA	GUARDRAIL ANCHORAGE, TP 1	46.000	835.95	38453.97	
0388	641-5020	EA	GUARDRL, ANCHOR, TP 12B,31 IN, FLR, E/A	4.000	2420.33	9681.32	
0393	647-1000	LS	TRAF SIGNAL INSTALLATION NO - SR 369	1.000	125000.00	125000.00	
0433	653-0110	EA	THERM PVMT MARK, ARROW, TP 1	3.000	69.63	208.92	
0438	653-0120	EA	THERM PVMT MARK, ARROW, TP 2	67.000	75.69	5071.49	

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JOB ESTIMATE REPORT

0443	653-0130	EA	THERM PVMT MARK, ARROW, TP 3	10.000	112.24	1122.45
0448	653-0170	EA	THERM PVMT MARK, ARROW, TP 7	12.000	106.62	1279.52
0453	653-0400	EA	THERM PVMT MARK, WORD, TP 21	3.000	316.00	948.00
0458	653-1501	LF	THERMO SOLID TRAF ST 5 IN, WHI	14868.000	0.46	6916.89
0463	653-1502	LF	THERMO SOLID TRAF ST, 5 IN YEL	58563.000	0.34	20325.46
0468	653-1704	LF	THERM SOLID TRAF STRIPE,24,WH	150.000	7.68	1152.28
0473	653-1804	LF	THERM SOLID TRAF STRIPE, 8,WH	1041.000	2.65	2759.86
0478	653-3501	GLF	THERMO SKIP TRAF ST, 5 IN, WHI	44800.000	0.21	9845.25
0483	653-6004	SY	THERM TRAF STRIPING, WHITE	1855.000	3.83	7117.52
0488	653-6006	SY	THERM TRAF STRIPING, YELLOW	182.000	4.33	788.54
0493	654-1001	EA	RAISED PVMT MARKERS TP 1	240.000	4.20	1008.48
0498	654-1003	EA	RAISED PVMT MARKERS TP 3	627.000	4.25	2666.18
0503	999-3110	EA	DETENTION POND	5.000	88000.00	440000.00

ITEM TOTAL	20984847.53
INFLATED ITEM TOTAL	20984847.53

TOTALS FOR JOB 0014133

ESTIMATED COST:	20984847.50
CONTINGENCY PERCENT (0.0):	0.00
ESTIMATED TOTAL:	20984847.50

NOTE: The item totals include all alternate items. The estimated totals include only the low cost alternate items.

GEORGIA DEPARTMENT OF TRANSPORTATION
PRELIMINARY ROW COST ESTIMATE SUMMARY

Date: 5/31/2017

Project:

Revised:

County: Cherokee

PI: 14133

Description: Widening of SR 20 from CR 765/Cherokee Dr to SR 369

Project Termini:

Existing ROW: Varies

Parcels: 102

Required ROW: Varies

Land and Improvements \$9,273,750.00

Proximity Damage \$125,000.00

Consequential Damage \$150,000.00

Cost to Cures \$325,000.00

Trade Fixtures \$100,000.00

Improvements \$1,189,000.00

Valuation Services \$333,750.00

Legal Services \$668,850.00

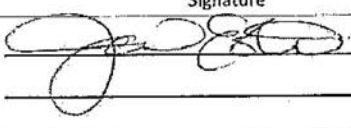
Relocation \$1,244,500.00

Demolition \$366,000.00

Administrative \$914,000.00

TOTAL ESTIMATED COSTS \$12,800,850.00

TOTAL ESTIMATED COSTS (ROUNDED) \$12,801,000.00

Preparation Credits	Hours	Signature
Jared BBS	15	

Prepared By:

Wesley K. Brock

CG#: 5147

(DATE) 6/13/17

Approved By:

Valencia Castro

CG#: 6545

(DATE) 6/14/17

NOTE: No Market Appreciation is Included in this Preliminary Cost Estimate

February 22, 2017

AECOM
Mr. Scot Gero
Project Manager
1360 Peachtree Street, Suite 500
Atlanta, GA 30309



RE: PI: 00014133-SR 20 Corridor Widening (Cherokee County)

Dear Mr. Gero:

Please find below the Preliminary Cost Estimate for each utility owner with facilities potentially located within the project limits:

Cardno

6649 Peachtree Industrial Blvd
Suite I
Peachtree Corners, GA 30092
USA

Phone: +1 678 421 0080
Fax: +1 770 421 0082

www.cardno.com

FACILITY OWNER	REIMBURSABLE	NON-REIMBURSABLE	TOTAL
Southern Company (GPC Distribution)	\$2,425,000.00	\$0.00	\$2,425,000.00
Sawnee EMC (SEMC)	\$0.00	\$0.00	\$0.00
Southern Company (AGL)	\$0.00	\$141,745.00	\$141,745.00
AT&T Telecommunications (ATT)	\$0.00	\$48,000.00	\$48,000.00
Crown Castle (Sunesys (SUN))	\$0.00	\$312,000.00	\$312,000.00
Windstream Communications (WST)	\$0.00	\$400,000.00	\$400,000.00
Comcast Communications/CATV	\$0.00	\$616,000.00	\$616,000.00
Cherokee County Water	\$0.00	\$164,330.00	\$164,330.00
Cherokee County Sewer	\$0.00	\$0.00	\$0.00
TOTAL	\$2,425,000.00	\$1,682,075.00	\$4,107,075.00

This estimate which was prepared by Venesia Horne, our Sr. Utility Coordinator, is based upon the current information and is preliminary. Cost are subject to change as plans and designs are developed further.

If you have any questions please feel free to call.

Sincerely,

Brandon Crawford
Project Manager

Table 7: Cumulative impacts to field-delineated waters from I-575 to N Corners Pkwy along Alignment 2. Widen Existing within currently proposed construction limits

Area of Design Influence	Feature	HUC	PI #	Length of impact (ft)	Area of impact (ac)
N/A	IS 1	03150104	0009164	95	
1	PS 17	03150104	0014132	49	
2	IS 37	03150104	0014132	11	
2	WL 38	03150104	0014132		0.001
3	PS 40	03150104	0014133	10	
4	PS 43	03150104	0014133	123	
4	PS 45	03150104	0014133	86	
5	WL 59	03150104	0002862		0.01
5	IS 60	03150104	0002862	209	
5	PS 62	03150104	0002862	143	
6	IS 70	03150104	0002862	72	
6	IS 76	03150104	0002862	135	
6	OW 75	03150104	0002862		0.013
7	PS 78	03130001	0002862	162	
7	PS 79	03130001	0002862	332	
7	IS 80	03130001	0002862	534	
8	IS 81	03130001	0002862	80	
9	IS 84	03150104	0002862	26	
10	IS 85	03150104	0002862	84	
10	WL 86	03150104	0002862		0.017
10	OW 87	03150104	0002862		0.054
11	IS 89	03130001	0003682	115	
12	IS 100	03130001	0003682	131	
12	PS 102	03130001	0003682	173	
12	PS 103	03130001	0003682	143	
12	IS 105	03130001	0003682	56	
12	IS 106	03130001	0003682	43	
12	PS 107	03130001	0003682	174	
12	PS 108	03130001	0003682	106	
12	PS 109	03130001	0003682	305	
12	WL 110	03130001	0003682		0.03
12	IS 111	03130001	0003682	146	
12	IS 112	03130001	0003682	191	
12	IS 113	03130001	0003682	85	
12	IS 114	03130001	0003682	80	
12	WL 115	03130001	0003682		0.005
13	PS 121	03130001	0003682	95	
TOTAL		03150104		1043	0.095
TOTAL		03130001		2951	0.035

WORKSHEET 1: ADVERSE IMPACT FACTORS FOR RIVERINE SYSTEMS WORKSHEET

Stream Type Impacted	Intermittent 0.1			Perennial Stream > 15' in width 0.4			Perennial Stream ≤ 15' in width 0.8		
Priority Area	Tertiary 0.5			Secondary 0.8			Primary 1.5		
Existing Condition	Fully Impaired 0.25			Somewhat Impaired 0.5			Fully Functional 1.0		
Duration	Temporary 0.05			Recurrent 0.1			Permanent 0.2		
Dominant Impact	Shade/ Clear 0.05	Utility X-ing 0.4	Bank Armor 0.7	Deten- tion 1.5	Stream Crossing (≤ 100') 1.7	Impound 2.7	Morpho- logic Change 2.7	Pipe >100' 3.0	Fill 3.0
Scaling Factor (Based on # linear feet impacted)	< 100' impact 0	100-200' impact 0.05	201-500' impact 0.1	501- 1000' impact 0.2	> 1000' impact 0.4 for each 1000' feet of impact (round impacts to the nearest 1000') (example: 2,200' of impact – scaling factor = 0.8; 2,800' of impact – scaling factor = 1.2)				

Reaches to Be Impacted	Reach 1	Reach 2	Reach 3	Reach 4
Complete the Following for Each Reach to Be Impacted				
Simon Channel Evolution Stage				
Rosgen Stream Type/D50				
Criteria for Selecting Existing Condition for Each Reach				
Bankfull Width and Depth	Width: Depth:	Width: Depth:	Width: Depth:	Width: Depth:
Bankfull Indicators (attach photograph showing bankfull for each reach)				
Factors	Reach 1	Reach 2	Reach 3	Reach 4
Stream Type Impacted	0.1	0.8		
Priority Area	1.5	1.5		
Existing Condition	0.5	0.5		
Duration	0.2	0.2		
Dominant Impact	1.7	1.7		
Scaling Factor	0.8	0.8		
Sum of Factors M =	4.8	5.5		
Feet Stream in Reach Impacted LF =	1387.91	1553.47		
M X LF =	6662	8544		

Total Mitigation Credits Required = (M X LF) = 17206

WETLANDS AND OPEN WATERS MITIGATION WORKSHEETS

ADVERSE IMPACT FACTORS

Factor	Options						
Dominant Effect	Fill 2.0	Dredge 1.8	Impound 1.6	Drain 1.4	Flood 1.2	Clear 1.0	Shade 0.5
Duration of Effects	7+ years 2.0	5-7 years 1.5	3-5 years 1.0	1-3 years 0.5	< 1 year 0.1		
Existing Condition	Class 1 2.0	Class 2 1.5	Class 3 1.0	Class 4 0.5	Class 5 0.1		
Lost Kind	Kind A 2.0	Kind B 1.5	Kind C 1.0	Kind D 0.5	Kind E 0.1		
Preventability	High 2.0	Moderate 1.0	Low 0.5	None 0			
Rarity Ranking	Rare 2.0	Uncommon 0.5	Common 0.1				

† These factors are determined on a case-by-case basis.

REQUIRED MITIGATION CREDITS WORKSHEET

Factor	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6
Dominant Effect	2.0					
Duration of Effect	2.0					
Existing Condition	1.0					
Lost Kind	1.5					
Preventability	1.0					
Rarity Ranking	0.1					
Sum of r Factors	$R_1 = 7.6$	$R_2 =$	$R_3 =$	$R_4 =$	$R_5 =$	$R_6 =$
Impacted Area	$AA_1 = 0.029$	$AA_2 =$	$AA_3 =$	$AA_4 =$	$AA_5 =$	$AA_6 =$
$R \times AA =$	0.22					

Total Required Credits = $\Sigma (R \times AA) =$

0.22

WORKSHEET 1: ADVERSE IMPACT FACTORS FOR RIVERINE SYSTEMS WORKSHEET

Stream Type Impacted	Intermittent 0.1			Perennial Stream > 15' in width 0.4			Perennial Stream ≤ 15' in width 0.8		
Priority Area	Tertiary 0.5			Secondary 0.8			Primary 1.5		
Existing Condition	Fully Impaired 0.25			Somewhat Impaired 0.5			Fully Functional 1.0		
Duration	Temporary 0.05			Recurrent 0.1			Permanent 0.2		
Dominant Impact	Shade/ Clear 0.05	Utility X-ing 0.4	Bank Armor 0.7	Deten- tion 1.5	Stream Crossing (≤ 100') 1.7	Impound 2.7	Morpho- logic Change 2.7	Pipe >100' 3.0	Fill 3.0
Scaling Factor (Based on # linear feet impacted)	< 100' impact 0	100-200' impact 0.05	201-500' impact 0.1	501- 1000' impact 0.2	> 1000' impact 0.4 for each 1000' feet of impact (round impacts to the nearest 1000') (example: 2,200' of impact – scaling factor = 0.8; 2,800' of impact – scaling factor = 1.2)				

Reaches to Be Impacted	Reach 1	Reach 2	Reach 3	Reach 4
Complete the Following for Each Reach to Be Impacted				
Simon Channel Evolution Stage				
Rosgen Stream Type/D50				
Criteria for Selecting Existing Condition for Each Reach				
Bankfull Width and Depth	Width: Depth:	Width: Depth:	Width: Depth:	Width: Depth:
Bankfull Indicators (attach photograph showing bankfull for each reach)				
Factors	Reach 1	Reach 2	Reach 3	Reach 4
Stream Type Impacted	0.1	0.8	0.4	
Priority Area	1.5	1.5	1.5	
Existing Condition	0.5	0.5	0.5	
Duration	0.2	0.2	0.2	
Dominant Impact	1.7	1.7	1.7	
Scaling Factor	0.8	0.8	0.8	
Sum of Factors M =	4.8	5.5	5.1	
Feet Stream in Reach Impacted LF =	665.20	451.71	89.73	
M X LF =	3193	2484	458	

Total Mitigation Credits Required = (M X LF) = 6135

WETLANDS AND OPEN WATERS MITIGATION WORKSHEETS

ADVERSE IMPACT FACTORS

Factor	Options						
Dominant Effect	Fill 2.0	Dredge 1.8	Impound 1.6	Drain 1.4	Flood 1.2	Clear 1.0	Shade 0.5
Duration of Effects	7+ years 2.0	5-7 years 1.5	3-5 years 1.0	1-3 years 0.5	< 1 year 0.1		
Existing Condition	Class 1 2.0	Class 2 1.5	Class 3 1.0	Class 4 0.5	Class 5 0.1		
Lost Kind	Kind A 2.0	Kind B 1.5	Kind C 1.0	Kind D 0.5	Kind E 0.1		
Preventability	High 2.0	Moderate 1.0	Low 0.5	None 0			
Rarity Ranking	Rare 2.0	Uncommon 0.5	Common 0.1				

† These factors are determined on a case-by-case basis.

REQUIRED MITIGATION CREDITS WORKSHEET

Factor	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6
Dominant Effect	2.0	2.0				
Duration of Effect	2.0	2.0				
Existing Condition	1.0	0.5				
Lost Kind	1.5	0.5				
Preventability	1.0	1.0				
Rarity Ranking	0.1	0.1				
Sum of r Factors	$R_1 = 7.6$	$R_2 = 6.6$	$R_3 =$	$R_4 =$	$R_5 =$	$R_6 =$
Impacted Area	$AA_1 = 0.13$	$AA_2 = 0.07$	$AA_3 =$	$AA_4 =$	$AA_5 =$	$AA_6 =$
$R \times AA =$	0.99	0.46				

Total Required Credits = $\Sigma (R \times AA) =$

1.45

Dunnahoo, Lindsey

From: Crosby, John
Sent: Wednesday, February 01, 2017 12:37 PM
To: Dawood, Laura
Cc: Covington, Christopher
Subject: FW: Mitigation credits for SR 20
Attachments: Stream worksheet.pdf; Wetland Worksheet.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

I just received a phone call from MRG. Wetland credits at their bank are permanently set at \$50,000. Wetland credits will equal \$84,000. Please let me know if you have any questions.

Thank you,

John Crosby
Scientist II
D: 864.234.3000 M: 404.275.8898
john.crosby@aecom.com

AECOM
10 Patewood Drive, Building VI, Suite 500, Greenville, South Carolina, 29615
F 864.234.3069
www.aecom.com

From: Crosby, John
Sent: Monday, January 30, 2017 1:51 PM
To: Dawood, Laura; Covington, Christopher
Cc: Wolfe, Kevin; Smith, William F
Subject: Mitigation credits for SR 20

Good afternoon,

I have attached the results of the mitigation calculation. The only wetland credits I have found within the service area are at the Etowah River Road bank (MRG bank 404-308-0662). No one answered the phone but I left a voice mail about the prices. We will need 1.68 wetland credits based on the shapefiles that I have. Stream credits will require 21,182 credits at 40 dollars a credit (\$847,280). This was at Bannister Creek Mitigation Bank from Corblu. I spoke with Greg and he said it is likely that they would be available in 2019. They haven't sold many. Prices may change over time. Once the project gets in more of a final stage we can calculate impacts on a case by case scenario and that would minimize the credits. Please let me know if you have any questions. I will email again if MRG calls back.

Thank you,

John Crosby
Scientist II
D: 864.234.3000 M: 404.275.8898
john.crosby@aecom.com

Attachment 4

Traffic Study

6. PI 0014133 Traffic Study

Section 6 analyses existing and future traffic conditions for the PI 0014133 project corridor: consisting of SR-20 from East Cherokee Drive to SR-369.

6.1 Existing Conditions

Section 6.1 describes character of intersections, existing traffic volumes, and current crash statistics along the PI 0014133 corridor.

6.1.1 Existing Transportation Facilities

Section 6.1.1 provides an overview of the existing major intersections along the project corridor. Most of the intersecting roadways in this project corridor are small neighborhood and subdivision roads, along with several business access roads.

6.1.1.1 SR-369/Hightower Road

SR-369 otherwise known as Hightower Road is a non-signalized intersection in PI 0014133, and also serves as the project endpoint. SR-20 currently expands to three lanes in the eastbound direction with a separated left turn, and expands to two lanes in the westbound direction with a separated right turn. The current posted speed limit on SR-369 is 55 mph. There are no bicycle lanes on either of these roadways. SR-369 intersection provides connectivity from SR-20 to SR-372 and a small commercial center there. This intersection is located in an area expected to develop with various residential and some small scale commercial uses.

6.1.2 Existing Traffic Volumes

Existing traffic count data was collected by GCA, Inc. for GDOT under a separate contract in October 2011. Twenty-four hour traffic counts were collected at 16 points along the corridor. Vehicle classifications and peak turning count movements were not collected within this project corridor; others in the total project area were used to estimate vehicle types and turning movements. Vehicle classification counts determine the relative proportions of cars, single-unit trucks and buses, and multi-unit or combination trucks utilizing the project corridor.

Plotted count locations provided by GCA, Inc. can be found in Appendix A. The existing traffic was utilized by GCA, Inc. to calculate K and D factors, truck percentages, and traffic growth rates as described in Section 6.2.1 of this report and Appendix B.

6.1.3 Corridor Safety Analysis

Safety is one of the most important aspects of any functioning corridor. This section describes data collection and analysis of crash data for the project corridor.

6.1.3.1 Crash Incidents

Total project corridor crash data was collected from the Georgia Electronic Accident Reporting System (GEARS)³. Crashes occurring between 2013 and 2015 were collected. County-level data was plotted using provided geographic coordinates, allowing for selection of project corridor incidents. Additional review of county-level crash data by street name ensured incidents along the corridor with incorrect or missing coordinate information were also included. The raw

³ Georgia Electronic Accident Reporting System (GEARS). Law enforcement reporting of traffic incidents in Georgia. Developed and maintained by Lexis Nexis on behalf of the Georgia Department of Transportation. <https://www.gearsportal.com/Pages/Public/Home.aspx>

counts were parsed by injuries and/or fatalities and crash rates compared to statewide averages. The resulting crash incident summary for the project corridor is presented in Table 14.

Table 14. Crash incidents SR-20 between East Cherokee Dr and SR-369

Year	Total			Injury			Fatal		
	# of crashes	Crashes per 100 MVM	Statewide avg crashes per 100 MVM	# of crashes	Crashes per 100 MVM	Statewide avg crashes per 100 MVM	# of crashes	Crashes per 100 MVM	Statewide avg crashes per 100 MVM
2013	37	325	132	7	62	37	1	8.79	1.21
2014	39	336	210	11	95	58	0	0.00	1.74
2015	35	296	n/a	8	68	n/a	1	8.44	n/a

Source: GCA, Inc. analysis of GEARS data

The total rate of crashes in the project corridor is much higher than the rate statewide in all years. Injury crash rates are also higher than statewide averages across all years; approximately 1.6 times the statewide average in 2013 and 2014. In addition, the one fatal crash in the corridor in each year 2013 and 2015 creates a fatal crash rate per 100 MVM roughly seven times the statewide average. The roadway improvements proposed by this project include a raised median, full median opening access only at signalized intersections, restricted median crossing U-turn access at moderately used un-signalized intersections, and indirect left access at low usage side streets and driveways. These improvements are expected to improve safety by reducing conflict points throughout the corridor.

6.2 Future Conditions

Section 6.2 describes the future traffic expected on the corridor, proposed design, and analysis of future corridor capacity after implementation of the proposed project along PI 0014133.

6.2.1 Traffic Forecast

Future traffic volumes were estimated by GCA, Inc. approved by GDOT and utilized by AECOM for a corridor capacity analysis.

6.2.1.1 Growth Rate Methodology

GCA Inc. estimated growth rates in April 2012 for the project corridor which were approved by GDOT. Linear regression analysis was performed by GCA, Inc. using the historical traffic count data. Using the equations, future year traffic volumes were generated and growth rates were calculated. The growth rates estimated by two of these sets of data are summarized in Table 15.

Table 15. PI 0014133 GDOT Approved Growth Rates

Scenario	Date Range	Growth Rate (%)
No Build	2011-2025	2.0
No Build	2025-2045	1.7
Build	2011-2025	3.4
Build	2025-2045	2.9

Source: GCA, Inc. Memorandum, Appendix B

The analysis by GCA, Inc. and approved by GDOT which generated these growth estimates is included in Appendix B.

6.2.1.2 Forecasted Volumes

The GDOT approved growth rates were applied to traffic in the opening and design years. This analysis estimates that the corridor will serve 21,000 vehicles per day by opening year 2025 and 37,600 vehicles per day in design year 2045.

All final projected volumes for the 2025 opening and 2045 design years are provided on traffic diagrams in Appendix C. These traffic volume diagrams were approved by GDOT, and include 2011 Existing Average Daily Traffic (ADT); 2011 Existing AM and PM Design Hour Volume (DHV); 2025 & 2045 ADT; 2025 AM and PM DHV; and 2045 AM and PM DHV.

6.2.1.3 Signal Warrants

Major intersections along the project corridor were assessed for new signalization using forecasted average daily traffic for 2025 Opening year Build Scenario. As shown in Table 16, SR 20 @ SR 369 (Hightower Road) would meet signal warrants in the opening year and it is recommended that the intersection be signalized.

Table 16. PI 0014133 Signal Warrants, 2025 Opening Year Build Scenario

Intersection with SR-20	2025 Opening Year Average Daily Traffic				GDOT Warrant 1A			GDOT Warrant 1B			New Signal Warranted
	ADT Major Street (two way)	ADT Minor Street (one way)	5.6% of Major Street (two way)	5.6% of Minor Street (one way)	100%	70%	56%	100%	70%	56%	
Hampton Station Blvd	20,300	600	1,137	34	NO	NO	NO	NO	NO	NO	NO
Orange Mill Rd	20,550	650	1,151	37	NO	NO	NO	NO	NO	NO	NO
SR 369 (Hightower Rd)	16,925	4,225	948	237	YES	YES	YES	YES	YES	YES	YES

Source: GCA, Inc. Analysis

6.2.2 Proposed Design

Previous alternatives analyses resulted in the decision to enhance the east-west mobility and safety of travelers in Cherokee and Forsyth Counties by improving SR-20. The project proposes a total of six lanes, with three travel lanes in each direction, separated by a raised median. The right of way required would range between 120 and 250 ft.

Extensive communications between AECOM and GDOT have resulted in a final design for the lanes in the corridor. This design of lanes and non-signalized roadway access points has been utilized in the Capacity Analysis, and is described in more detail in Section 6.2.3.2.

6.2.3 Capacity Analysis

This analysis allows comparison of future traffic conditions associated with the proposed roadway design.

6.2.3.1 Background

The 2010 HCM defines Level of Service (LOS) in terms of average control delay per vehicle, which is composed of initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. LOS A indicates operations with very low control delay, while LOS F

describes operations with extremely high average control delay. Several factors affect the controlled delay for un-signalized intersections, such as availability and distribution of gaps in the conflicting traffic stream, critical gaps, and follow-up time for a vehicle in the queue. LOS in concept is visualized in Figure 5, and the various HCM LOS criteria are summarized in Table 4, both located in Section 4 of this report.

6.2.3.2 Synchro Model Design

AECOM utilized Syncho 9.0 software for the project corridor capacity analysis. Syncho uses HCM methodology to model traffic along a corridor and then assigns LOS values to corridor intersections. The current roadway physical design was utilized for the 2011 Existing year model. The proposed design of a total of six lanes, with three travel lanes in each direction, separated by a raised median was applied for the 2025 Opening and 2045 Design year models.

Innovative intersection improvements were applied throughout the corridor. These improvements included numerous Restricted Crossing U-Turns (RCUT) as well as Median U-Turn Intersections (MUT) to improve safety.

Currently existing timing plans, typically running free, were utilized in the 2011 Existing year Synchro model. Signal timing was optimized at a 150 second cycle for the 2025 Opening year and 2045 Design year models. Splits were optimized in these plans.

Due to the limited turning movement counts collected in the project corridor, AECOM determined that peak hour factors should be estimated using all count locations, averaged and then applied throughout the entire project corridor from Scott Road to North Corners Parkway. These peak hour factors were calculated for left, right and thru movements on both the mainline and side streets as shown in Table 17, then utilized in Synchro. The data from which these factors were calculated can be found in Appendix D.

Table 17. Peak Hour Factors utilized in Synchro Capacity Analysis

Movement	Average Peak Hour Factor	
	AM	PM
Mainline Thru	0.86	0.91
Mainline Left	0.66	0.70
Mainline Right	0.65	0.76
Sidestreet Thru	0.57	0.67
Sidestreet Left	0.69	0.74
Sidestreet Right	0.68	0.68

Source: AECOM Analysis, Appendix D

Truck percentages calculated by GCA, Inc. were utilized for each corridor by project number. For PI 0014133, existing 24-hour truck percentage was approximately six percent: with four percent single-unit trucks and two percent of tractor trailers. For PI 0014133, average peak hour truck percentage of four percent: with three percent of single-unit trucks and one percent of tractor trailers. The following truck percentages were used in 2025 Opening and 2045 Design year models.

24-hour Truck volumes = 16%, Single-Unit = 10%, Combination = 6%
Peak hour Truck volumes = 12.5%, Single-Unit = 7.5%, Combination = 5%

A more detailed explanation of the GCA, Inc. analysis resulting in these percentages is included in Appendix B.

6.2.3.3 Capacity Analysis Results

Section 6.2.3.3 provides a summary of the capacity analysis results in terms of intersection level of service and intersection time delay.

Table 18. PI 0014133 AM Peak Hour Capacity Analysis by Intersection: Existing 2011, and Opening Year 2025, Design Year 2045

Intersection with SR-20	Control	No Build AM 2011 Existing Year		No Build AM 2025 Opening Year		Build AM 2025 Opening Year		No Build AM 2045 Design Year		Build AM 2045 Design Year	
		LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
Hampton Station Blvd†	Stop, NB	D	33.8	F	75.1	C	15.4	F	>300.0	E	46.5
Dock Lathem Trail†	Stop, NB	D	34.2	F	56.7	B	14.3	F	291.5	D	26.5
	Stop, SB†	D	42.3	F	105.9	C	16.4	F	>300.0	F	50.0
Northwoods Drive†	Stop, SB	C	22.9	D	41.0	C	16.8	F	>300.0	F	69.2
Cotton Drive	Stop, NB	C	22.5	D	31.5	B	14.3	F	139.0	D	27.6
Old Orange Mill Road†	Stop, NB	E	49.4	F	215.5	C	17.4	F	>300.0	F	133.1
Old Ballground Road	Stop, SB	D	27.3	F	59.1	B	14.8	F	>300.0	D	29.5
"New Road"	Stop, SB	N/A	N/A	D	30.3	B	14.3	F	73.7	D	27.8
Crystal Spring Trail	Stop, NB	D	32.6	E	54.6	B	13.7	F	248.9	C	23.2
	Stop, SB	D	32.8	E	55.2	B	14.4	F	236.9	D	26.3
SR-369	No Build: Stop, SB Build: Signal	D	27.3	E	42.5	B*	14.1*	F	290.6	C*	26.7*

Source: 2000 Highway Capacity Manual, GCA, Inc. Analysis, *HCS 2000

As Table 18 shows, the PI 0014133 Build scenario is expected to provide a higher level of service and less delay than the No-Build scenario in both opening and design years.

Table 19. PI 0014133 PM Peak Hour Capacity Analysis by Intersection: Existing 2011, and Opening Year 2025, Design Year 2045

Intersection with SR-20	Control	No Build PM 2011 Existing Year		No Build PM 2025 Opening Year		Build PM 2025 Opening Year		No Build PM 2045 Design Year		Build PM 2045 Design Year	
		LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
Hampton Station Blvd†	Stop, NB	D	27.2	E	48.2	C	15.7	F	>300.0	E	39.8
Dock Lathem Trail	Stop, NB	E	37.8	F	68.0	C	15.1	F	>300.0	D	31.1
	Stop, SB	E	45.7	F	93.5	B	14.8	F	>300.0	D	31.1
Northwoods Drive†	Stop, SB	D	29.3	F	61.2	C	15.3	F	>300.0	E	36.5
Cotton Drive	Stop, NB	D	30.7	F	50.5	C	15.0	F	290.8	D	31.3
Old Orange Mill Road†	Stop, NB	D	32.7	F	71.8	C	16.0	F	>300.0	E	49.6
Old Ballground Road	Stop, SB	C	24.6	E	38.5	B	14.4	F	123.9	D	25.5
"New Road"	Stop, SB	N/A	N/A	N/A	N/A	B	14.7	F	111.8	D	27.4
Crystal Spring Trail	Stop, NB	E	35.6	F	67.0	B	14.8	F	>300.0	D	28.1
	Stop, SB	E	35.6	F	67.0	B	14.5	F	>300.0	D	26.7
SR-369	No Build: Stop, SB Build: Signal	C	22.9	D	68.9	B*	16.9*	F	>300.0	D*	43.1*

Source: 2000 Highway Capacity Manual, GCA, Inc. Analysis; *HCS 2000

As Table 19 shows, the PI 0014133 Build scenario is expected to provide a higher level of service and less delay than the No-Build scenario in both opening and design years. Four intersections Hampton Station Boulevard, Dock Lathem Trail, Northwood Drive and Old Orange Mill Road across the AM or PM periods experience LOS E or LOS F in the design year. These intersections are marked with a dagger (†) in Tables 18 and 19. Two main engineering mitigation actions were considered to improve these results: signals and additional turn lanes.

6.2.3.4 Mitigation Actions

The potential for a new signal at failing intersections was assessed at a planning level using standards set by the U.S. Department of Transportation Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD). Currently, un-signalized SR-369/Hightower Road meets these planning-level signal warrants 1A and 1B for a new signal.

Although additional turn lanes were considered for the other intersections predicted to perform poorly, we do not consider these values to be highly concerning to the project. Highway Capacity Software used in this analysis assumes consistent headways between vehicles, whereas in the real world vehicle tend to travel in platoons. These platoons enable vehicles on side roads like many of these poor LOS intersections to enter traffic during the gaps between platoons. Since these gaps are not accounted for in the software, it incorrectly assumes that these vehicles will be severely delayed, when in fact they may not wait as long in the real world.

6.3 Conclusions

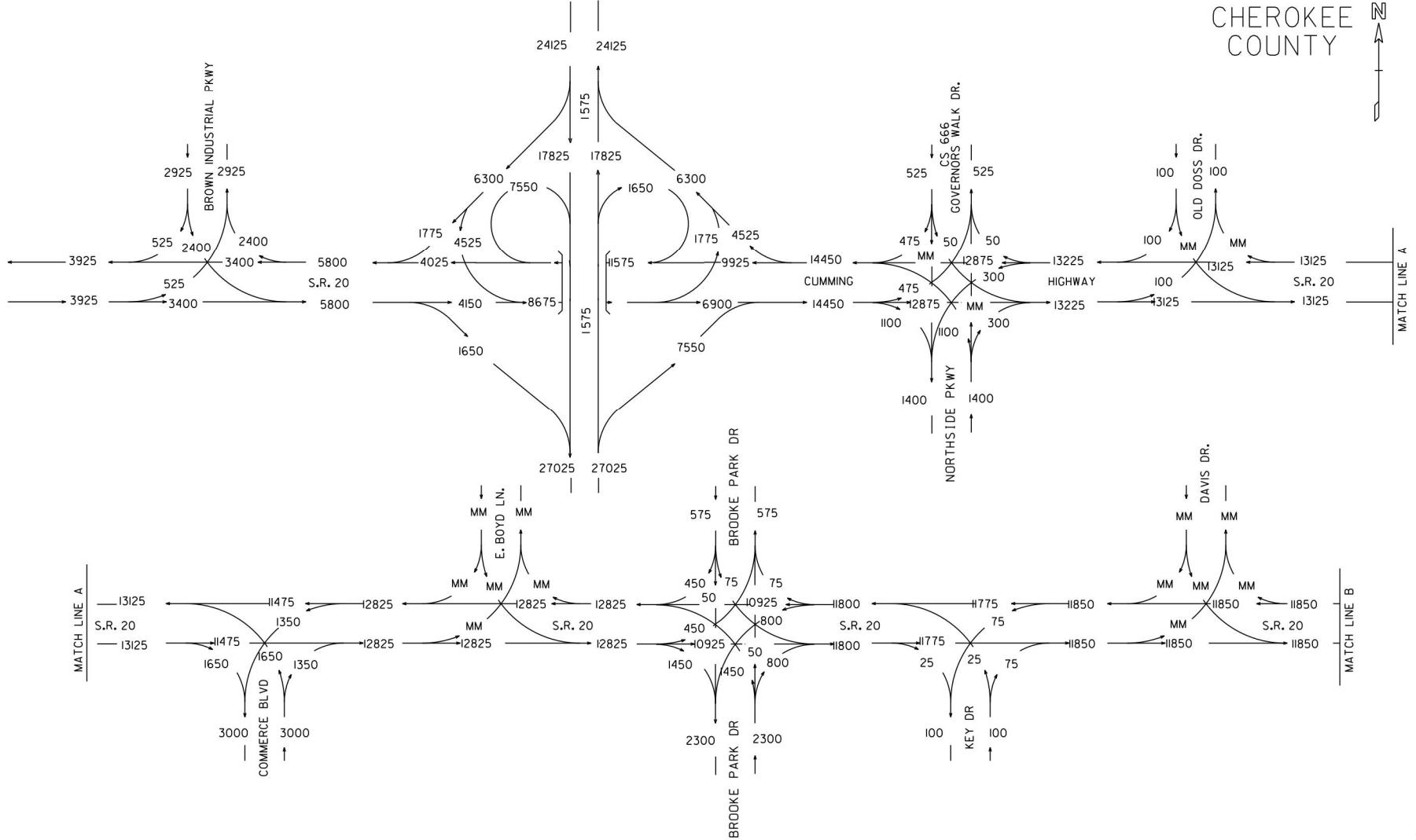
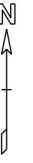
This study focused on using existing and future traffic data to determine the appropriate transportation improvement to provide a safe and efficient transportation corridor. Existing facilities and future planned projects are aligned with widening capacity on SR-20 from East Cherokee Drive to SR-369. Our review of crash data for the project corridor does not prohibit widening the road; indeed there is some evidence where congestion is causing additional safety concerns. Two scenarios were considered: No-Build and Build in existing 2011, opening 2025 and design 2045 years.

GDOT approved traffic forecasting methods were used to conduct a lane call capacity analysis, which indicated that six lanes are needed on the corridor by 2025. The results of an intersection capacity analysis for the entire corridor provide further support for widening; this alternative provides the highest number of intersections providing level of service of D or better in every year and time period (AM or PM) studied. Although some intersections along the project corridor, primarily small side roads, are expected to have unacceptable level of service in the design year Build scenario, the project team finds this to be an over-estimation due to software model limitations. Finally, planning-level signal warrant analysis indicates that no additional signals are warranted along the PI 0014133 project corridor.

Attachment 5

Traffic Diagrams

CHEROKEE COUNTY



CD
5/14

STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2011 ADT

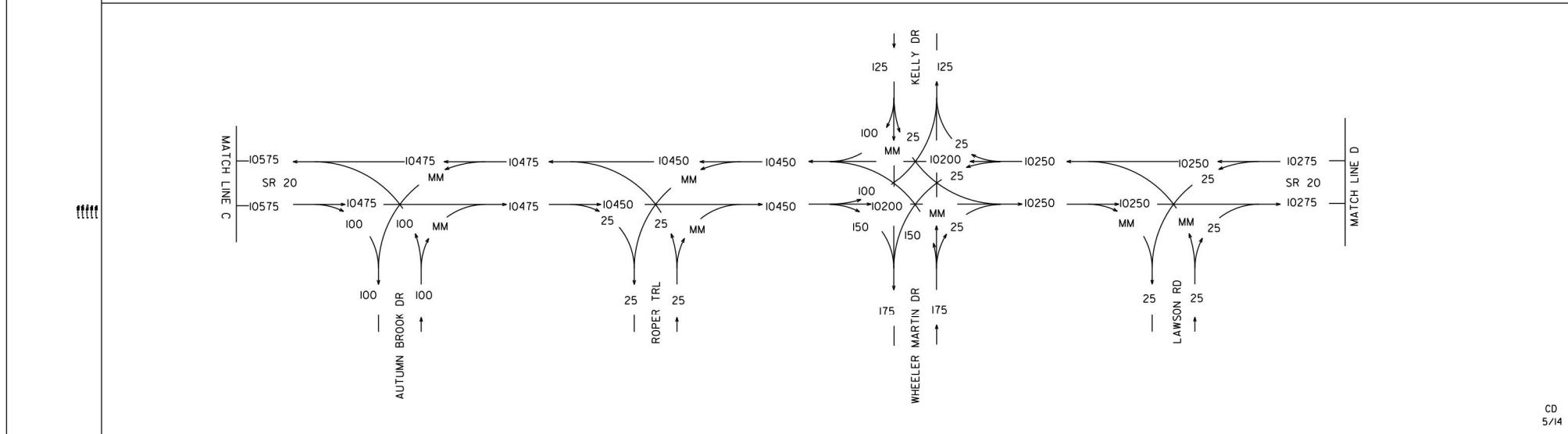
GCA
GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

24 HOURS T = 16%
S.U. = 10%
COMB. = 6%

REVISION DATES		

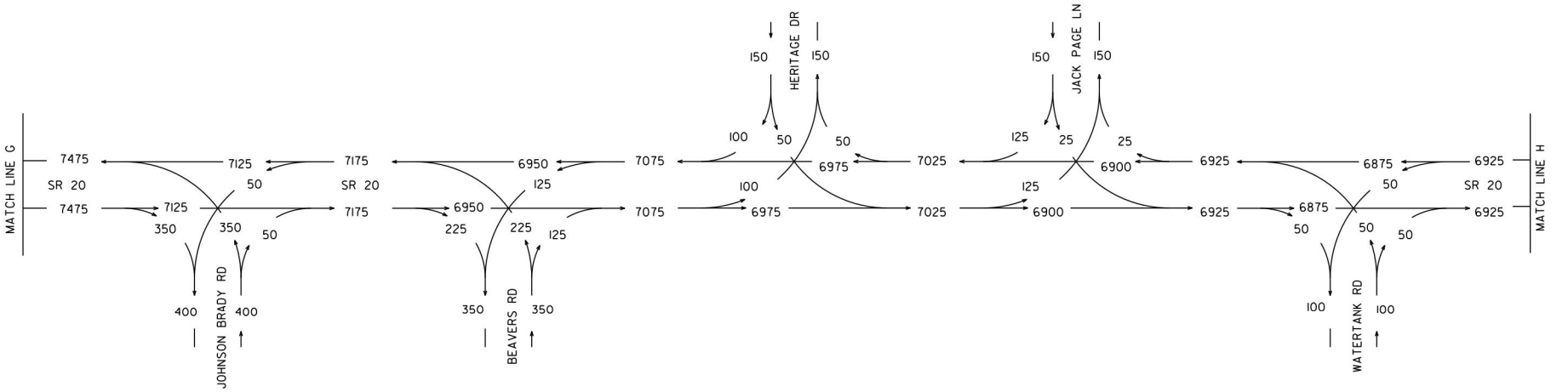
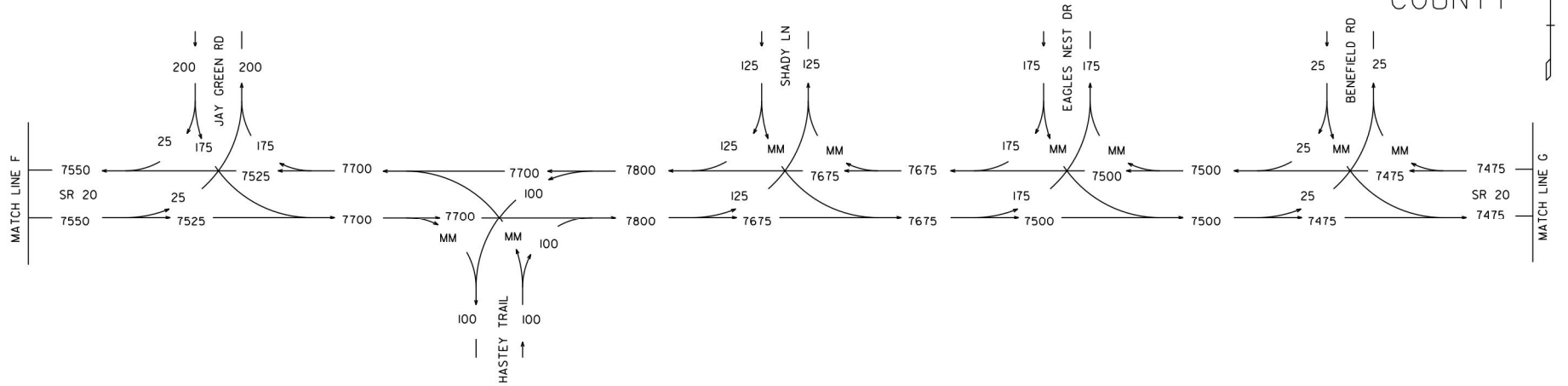
STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING NO.
10-1



DRAWING No.
10-2

CHEROKEE COUNTY



STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2011 ADT

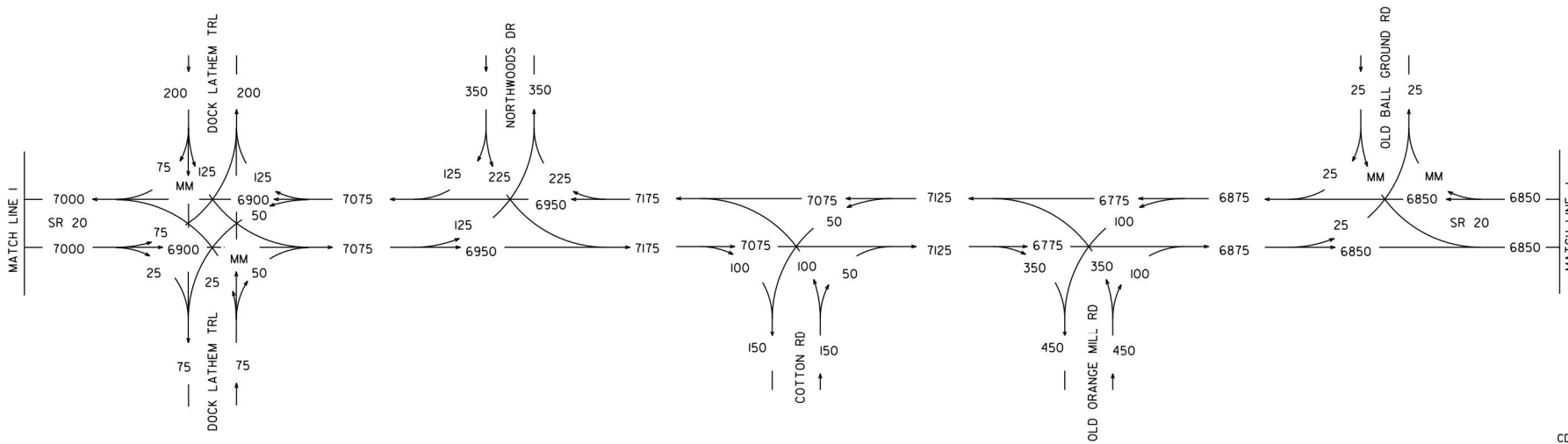
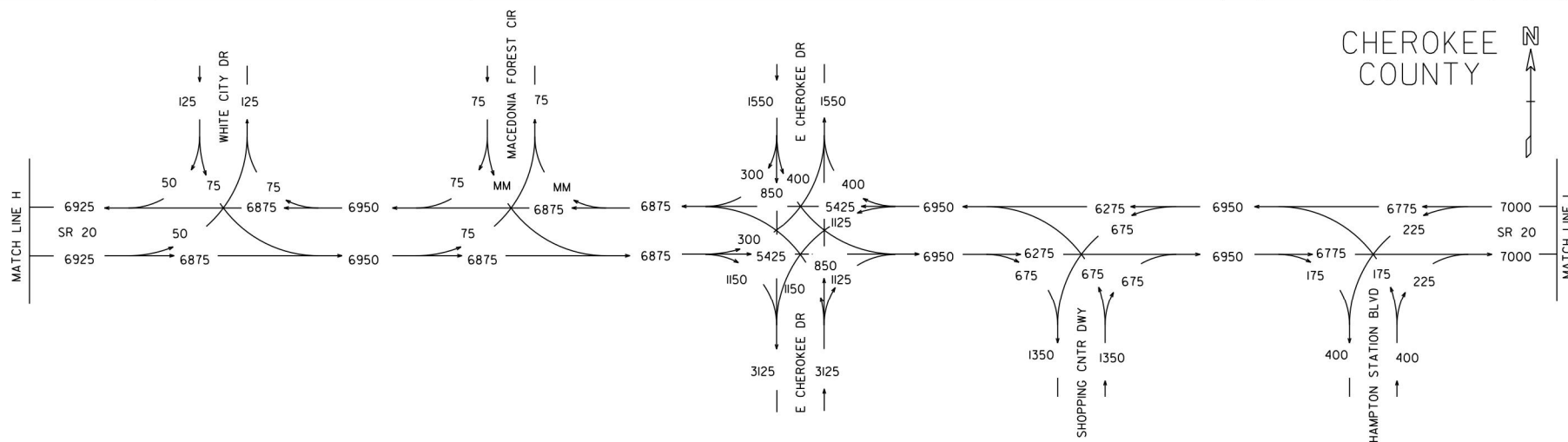
GCA GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH 404-355-4000 FAX 404-355-0604

24 HOURS T = 16%
S.U. = 10%
COMB. = 6%

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING NO.
10-4



STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2011 ADT

GCA INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH 404-355-4010 FAX 404-355-0604

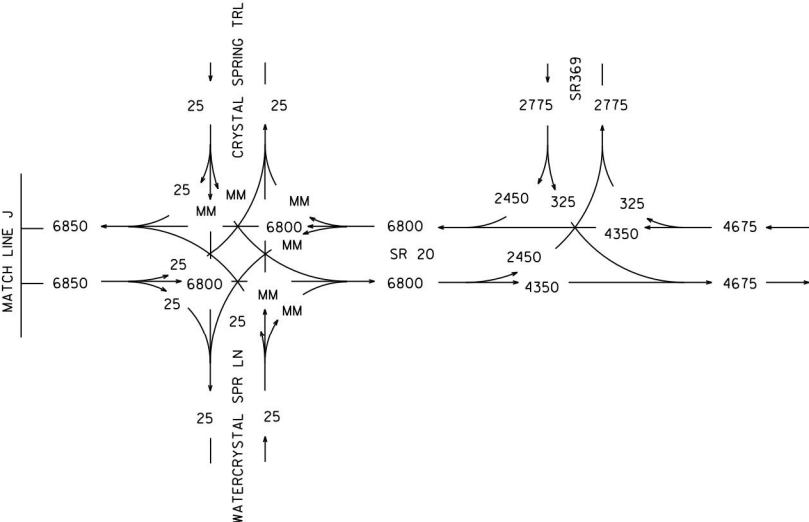
24 HOURS T = 16%
S.U. = 10%
COMB. = 6%

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

CD
5/14

DRAWING NO.
10-5



CHEROKEE
COUNTY

CD
5/14

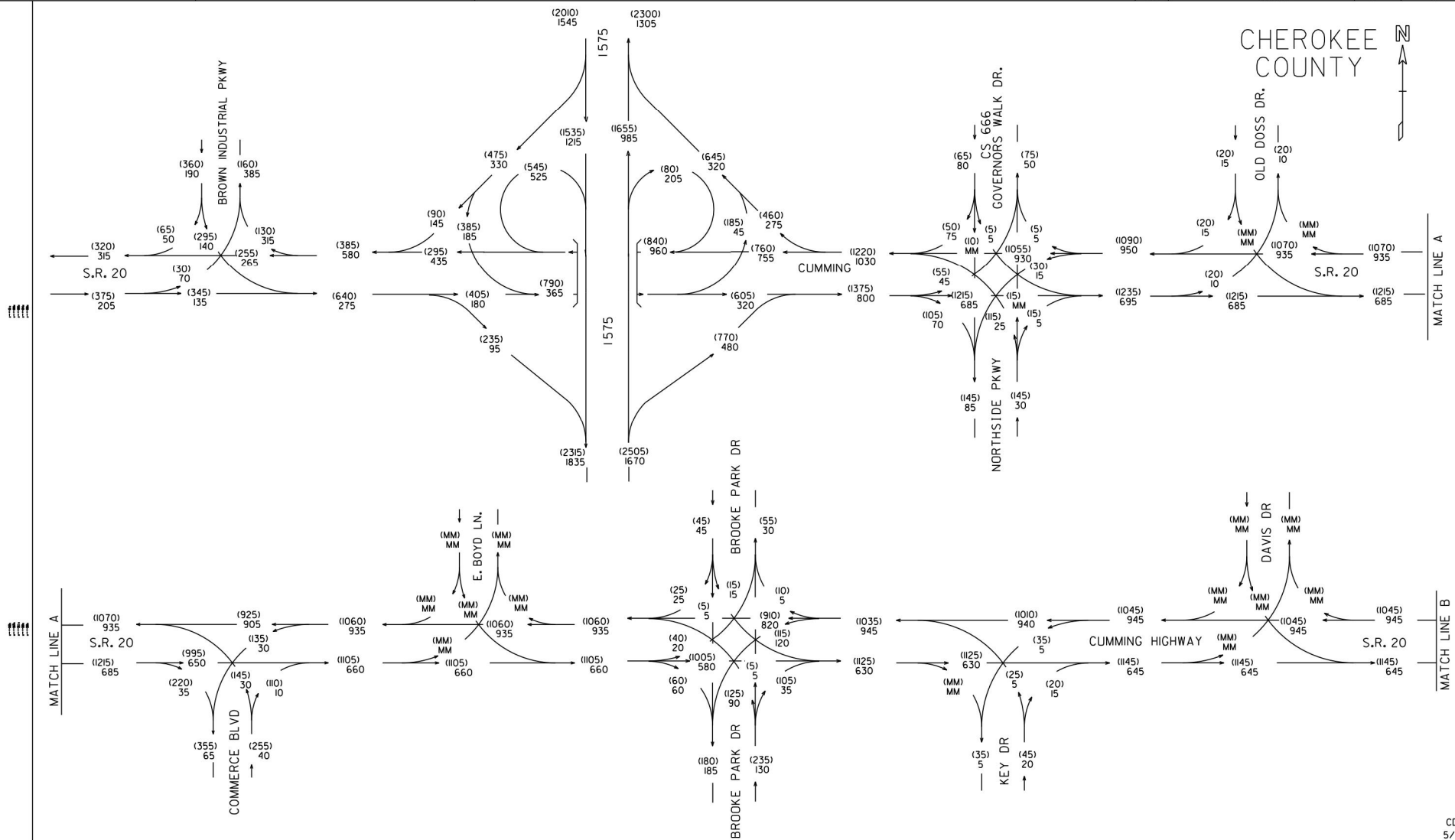
STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2011 ADT

GCA
GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH: 404-355-4000 FAX: 404-355-0604

24 HOURS T = 16%
S.U. = 10%
COMB. = 6%

REVISION DATES			STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION	
			OFFICE: PLANNING	
			TRAFFIC DIAGRAM	
			DRAWING No.	
			10-6	



STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2011 PM DHV = (000)
2011 AM DHV = 000

GCA INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

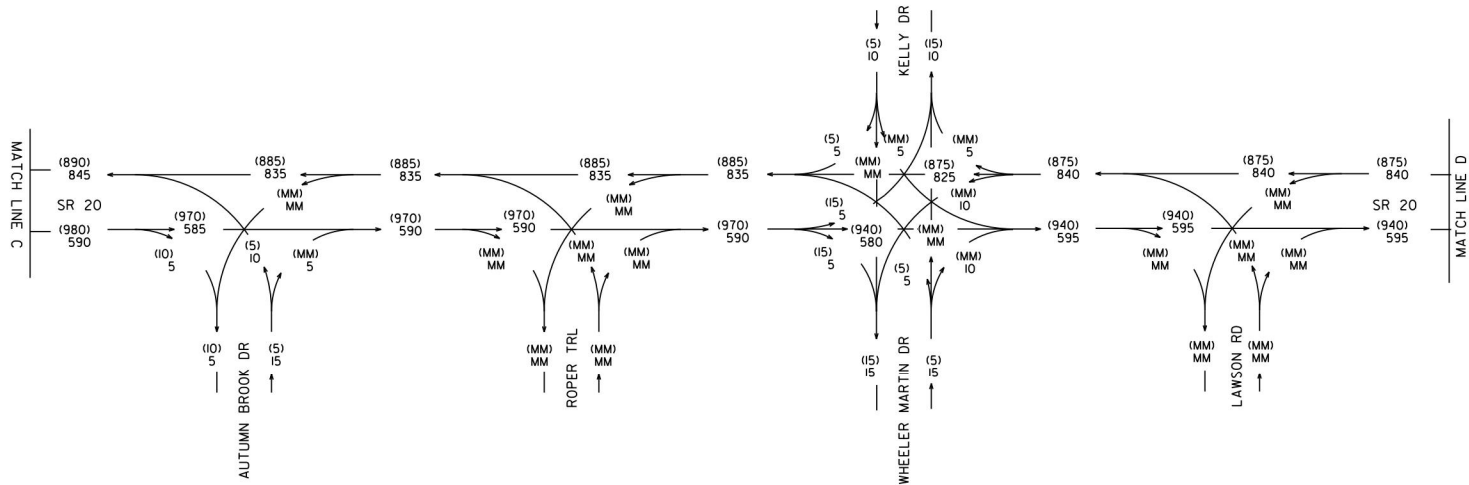
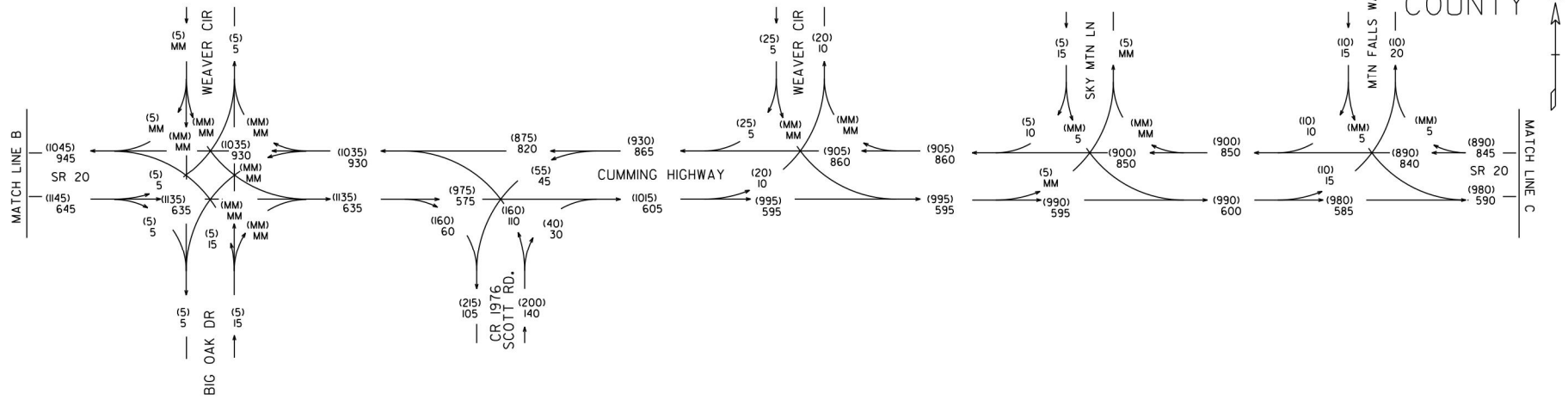
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

CD
5/14

DRAWING NO.

10-7



STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2011 PM DHV = (000)
2011 AM DHV = 000

GCA
GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH: 404-355-4000 FAX: 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

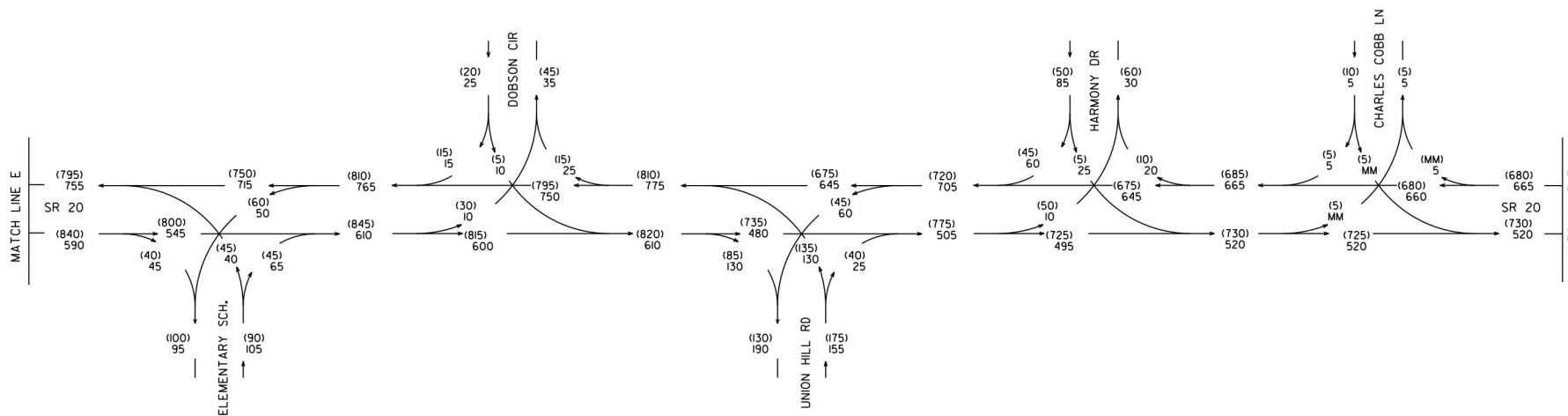
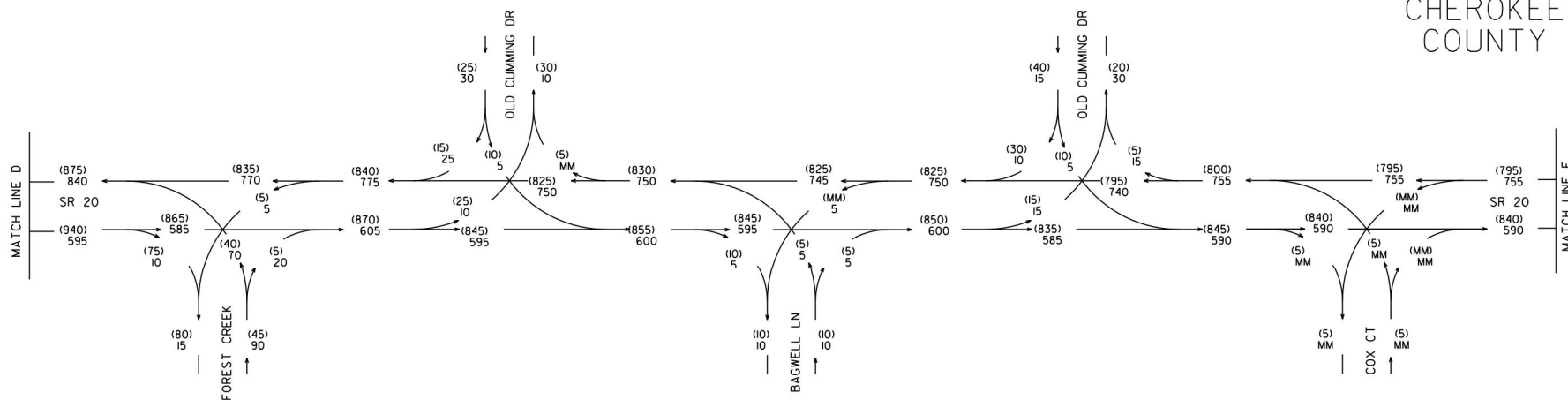
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

CD
5/14

DRAWING NO.
10-8

DATE## #USER#	TIME## #PRF## #SPENTABLE##	DOC##	STATE GA	PROJECT NUMBER 0003681	SHEET NO. 3	TOTAL SHEETS 6
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STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2011 PM DHV = (000)
2011 AM DHV = 000

GCA
GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH: 404-355-4000 FAX: 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

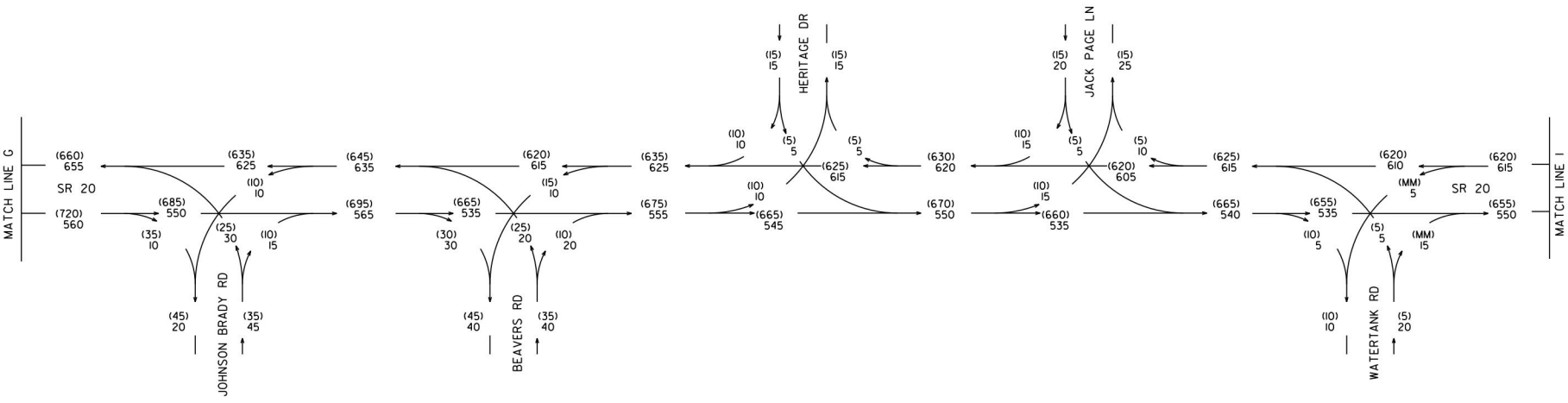
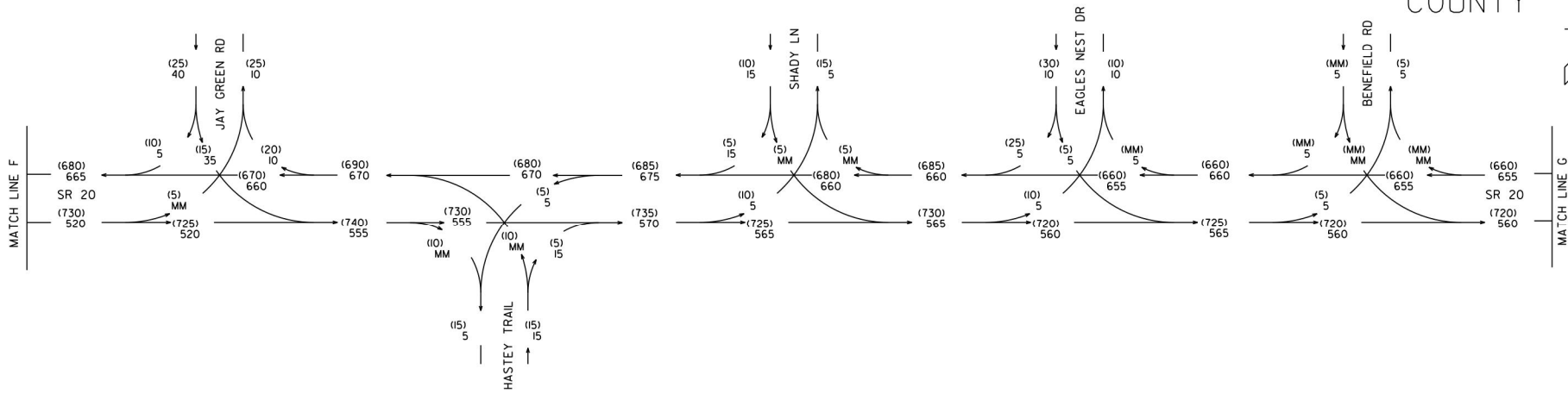
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING NO.
10-9

CD
5/14

CHEROKEE COUNTY



CD
5/14

STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2011 PM DHV = (000)
2011 AM DHV = 000

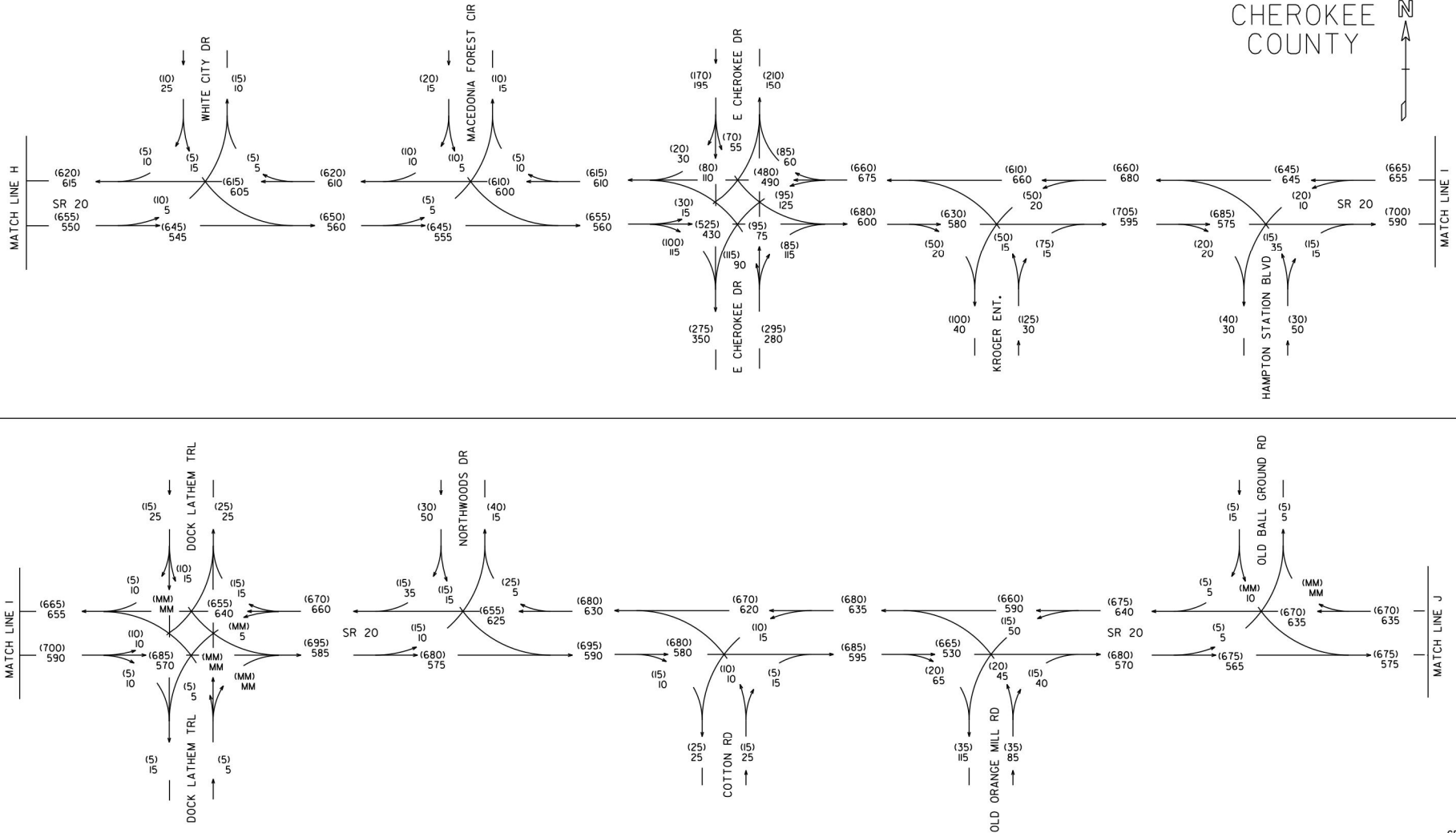
GCA
GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH: 404-355-4000 FAX: 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

REVISION DATES	

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING NO.
10-10



STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2011 PM DHV = (000)
2011 AM DHV = 000

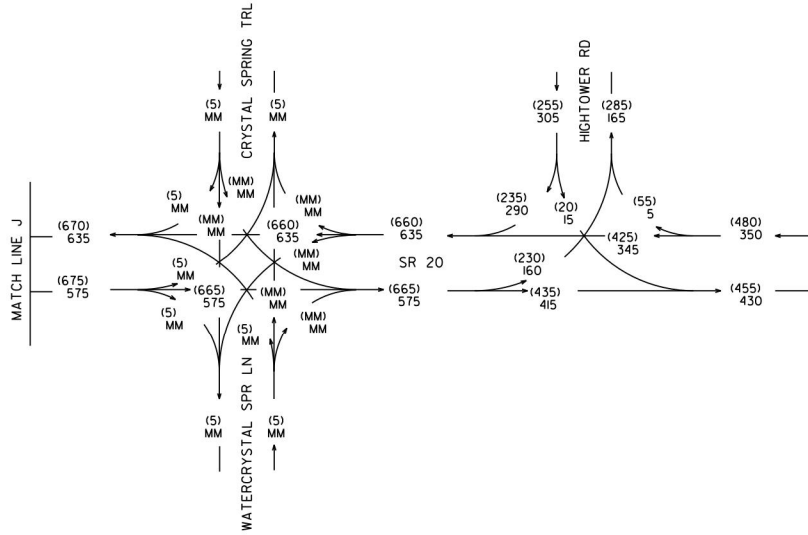
GCA
CCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH 404-355-4000 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No.
10-11



CHEROKEE COUNTY

N

CD
5/14

STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2011 PM DHV = (000)
2011 AM DHV = 000

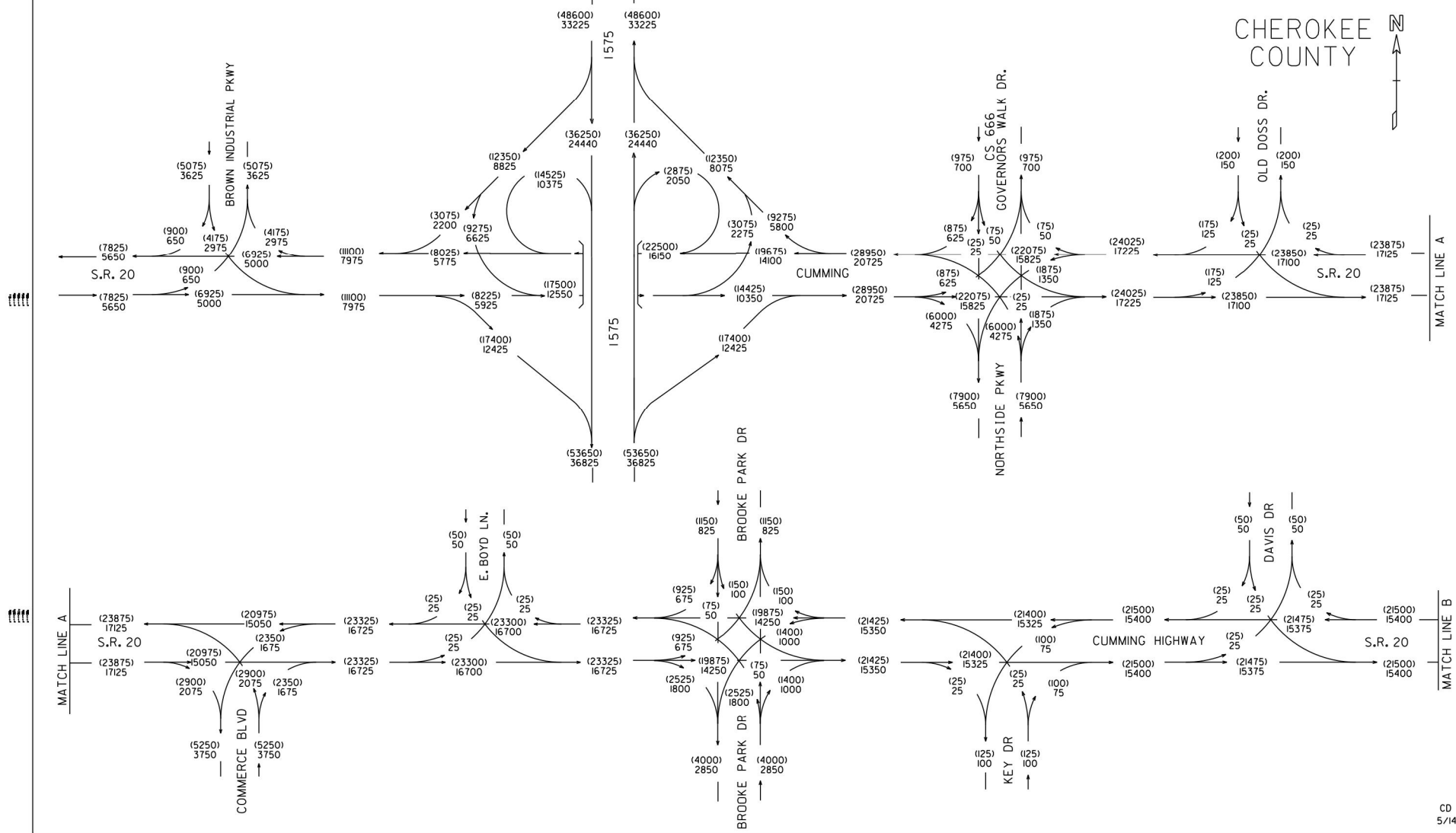
GCA GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4000 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No.
10-12



STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2045 NO BUILD ADT = (000)
2025 NO BUILD ADT = 000

GCA GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

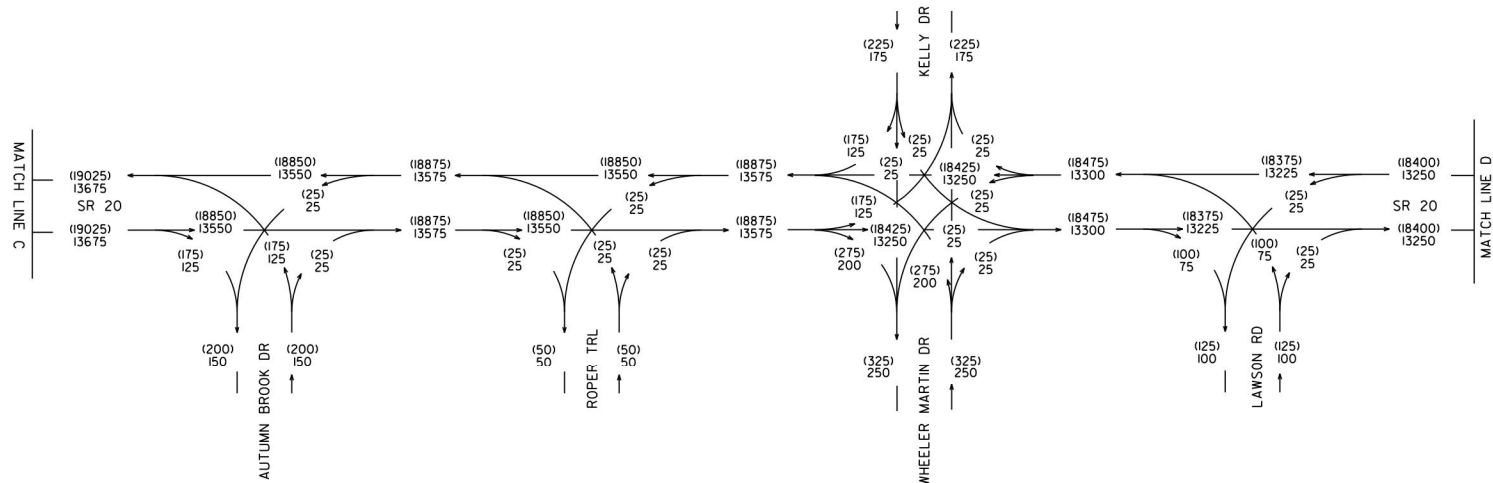
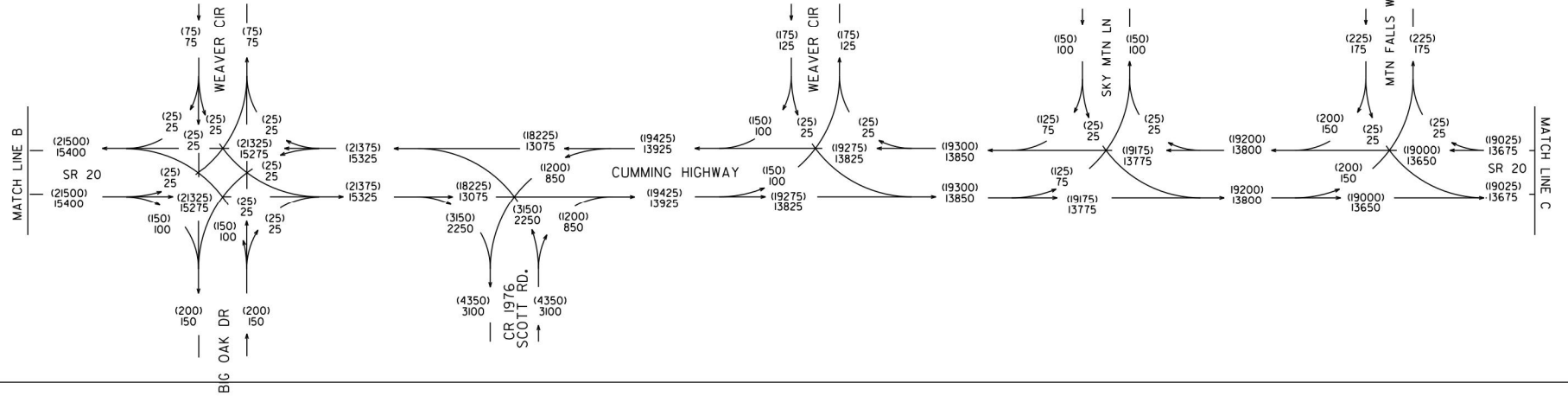
24 HOURS T = 16%
S.U. = 10%
COMB. = 6%

REVISION DATES	

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING NO.
10-13

CHEROKEE
COUNTY



CD
5/14

STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2045 NO BUILD ADT = (000)
2025 NO BUILD ADT = 000

GCA
GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH: 404-355-4000 FAX: 404-355-0604

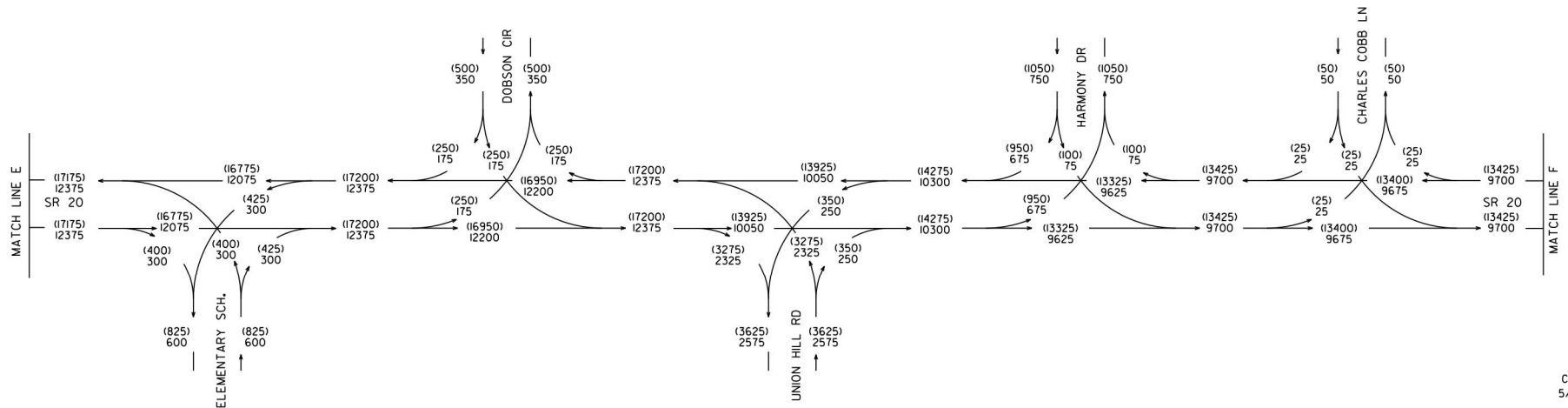
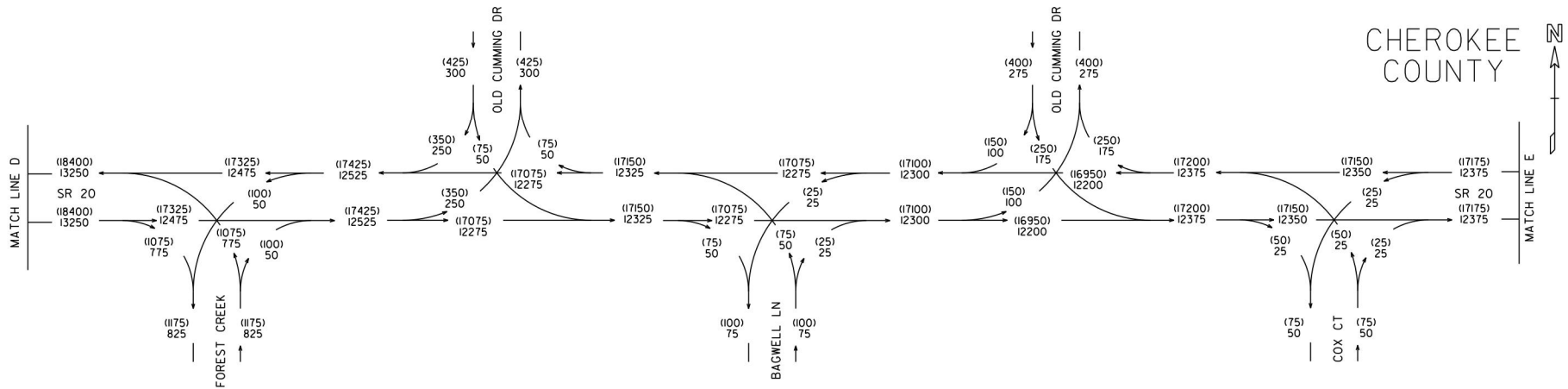
24 HOURS T = 16%
S.U. = 10%
COMB. = 6%

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING NO.

10-14



STP00-0003-00(681)
P.L.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2045 NO BUILD ADT = (000)
2025 NO BUILD ADT = 000

GCA
GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH: 404-355-4010 FAX: 404-355-0604

24 HOURS T = 16%
S.U. = 10%
COMB. = 6%

REVISION DATES

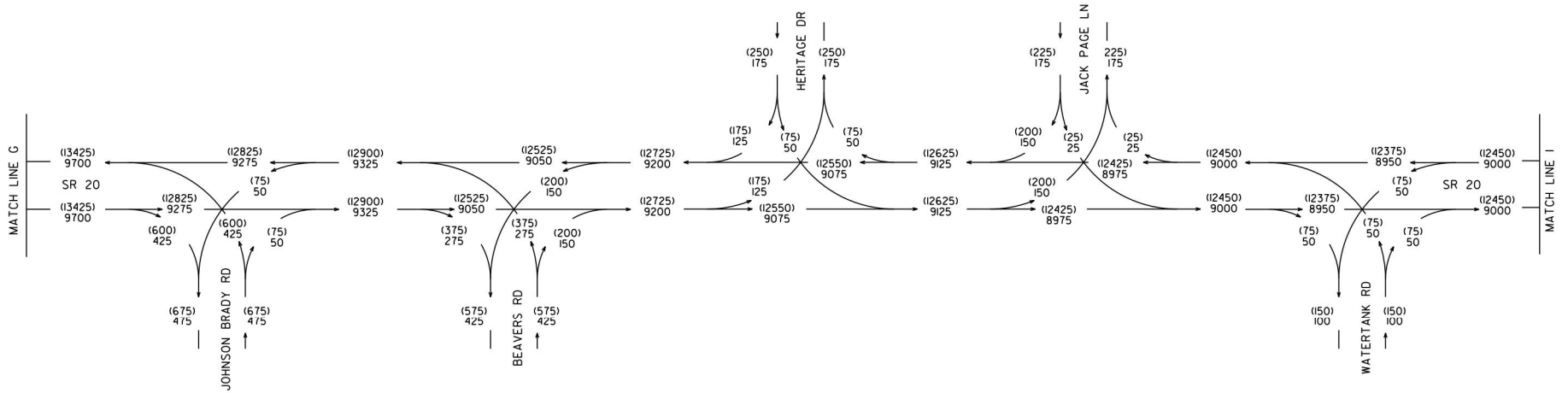
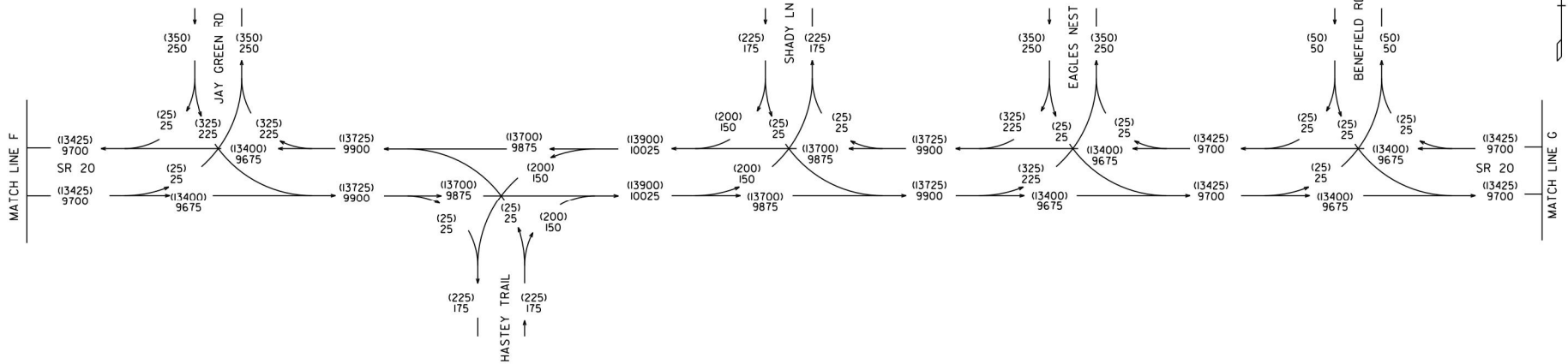
STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No.

10-15

DATE##	TIME##	#PRF##	#DCW#	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
#USER#		#PENTABLE##		GA	0003681	4	6

CHEROKEE COUNTY



CD
5/14

STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2045 NO BUILD ADT = (000)
2025 NO BUILD ADT = 000

GCA
GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH 404-355-4000 FAX 404-355-0604

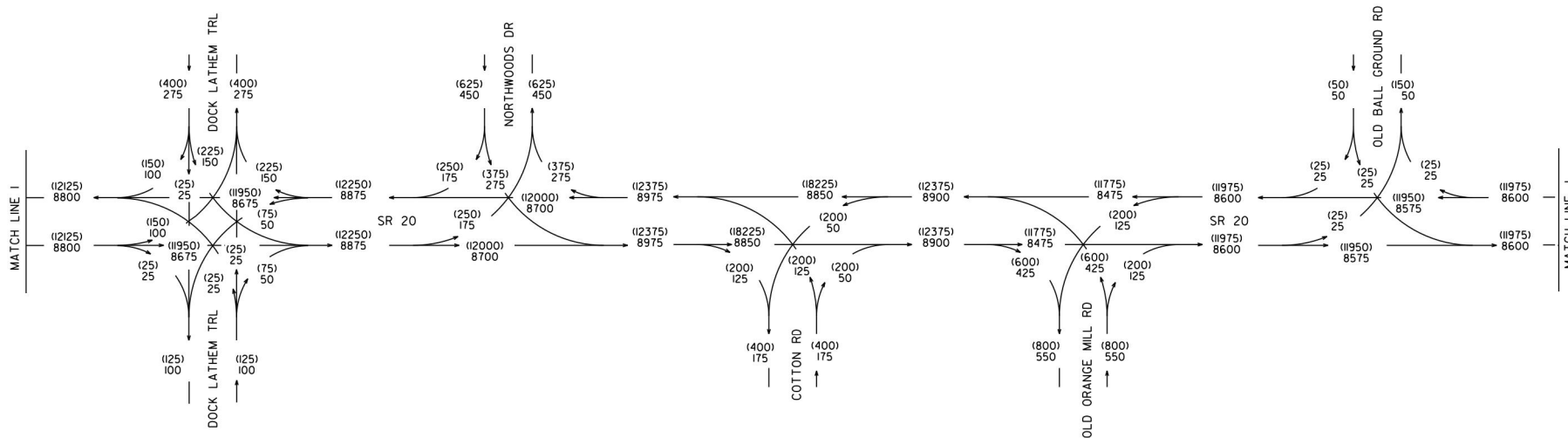
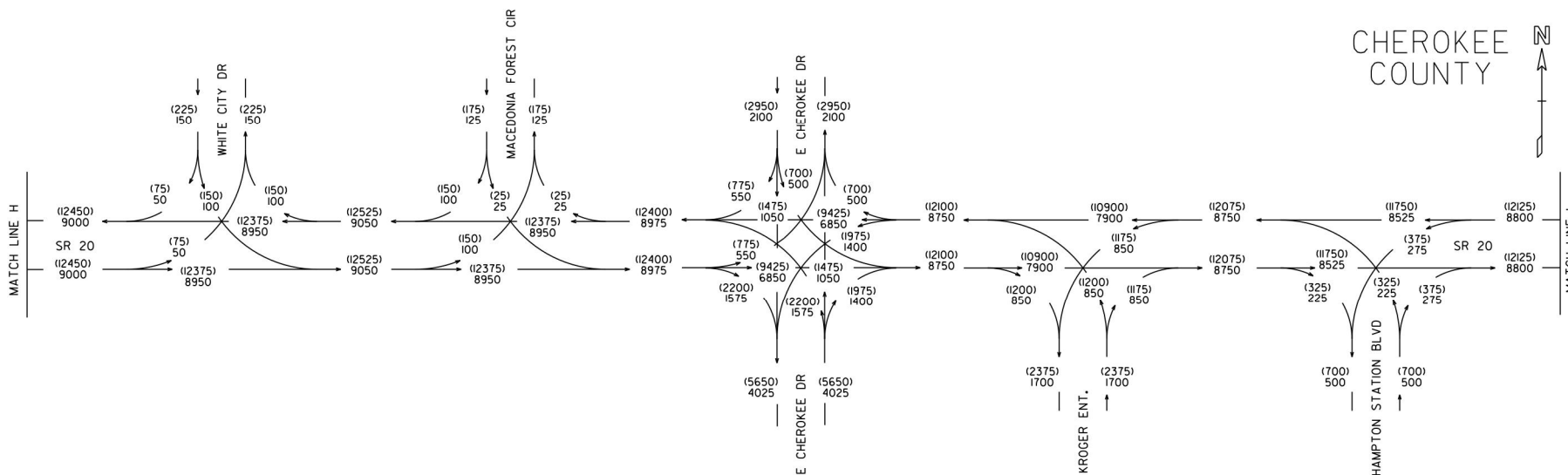
24 HOURS T = 16%
S.U. = 10%
COMB. = 6%

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING NO.

10-16



STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2045 NO BUILD ADT = (000)
2025 NO BUILD ADT = 000

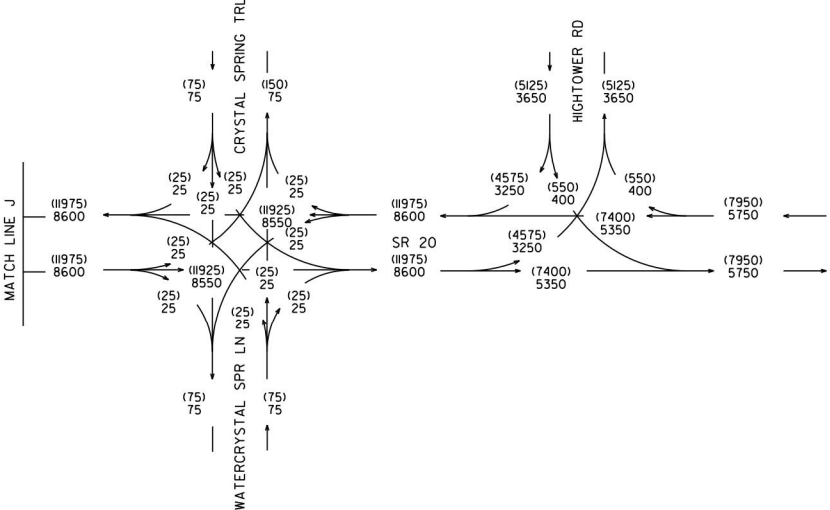
GCA
GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH: 404-355-4000 FAX: 404-355-0604

24 HOURS T = 16%
S.U. = 10%
COMB. = 6%

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No.
10-17



CHEROKEE
COUNTY



STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

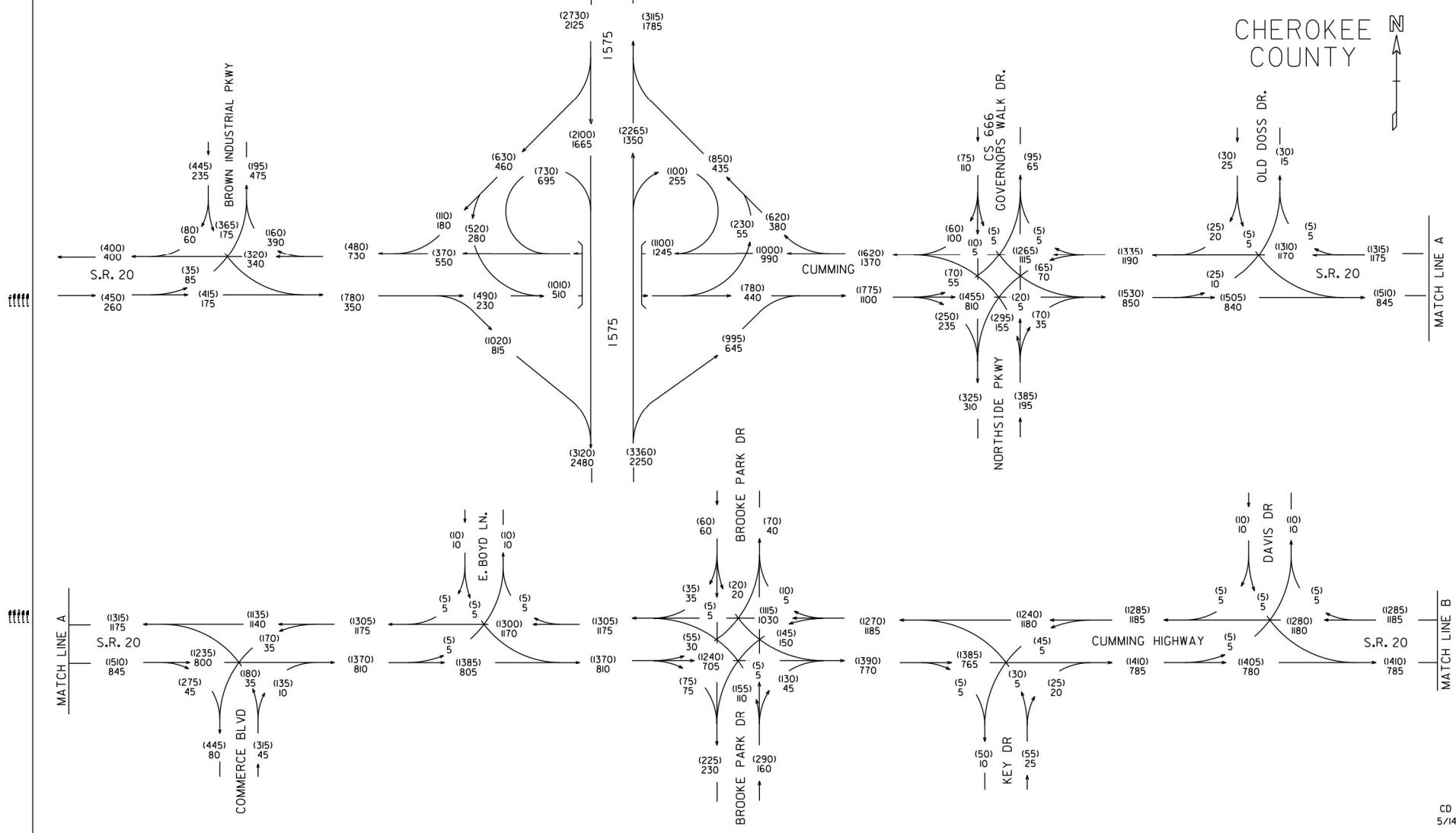
2045 NO BUILD ADT = (000)
2025 NO BUILD ADT = 000

GCA
GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH: 404-355-4000 FAX: 404-355-0604

24 HOURS T = 16%
S.U. = 10%
COMB. = 6%

REVISION DATES			STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION	
			OFFICE: PLANNING	
			TRAFFIC DIAGRAM	
			DRAWING No.	
			10-18	

CD
5/14



CD
5/14

STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2025 NO BUILD PM DHV = (000)
2025 NO BUILD AM DHV = 000

GCA GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

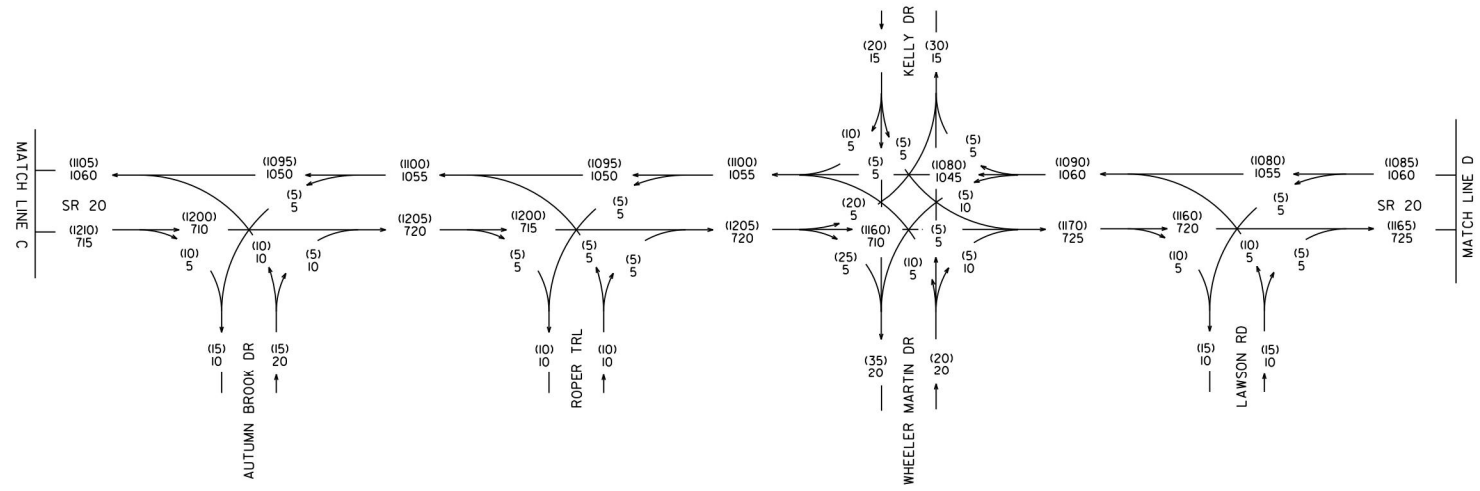
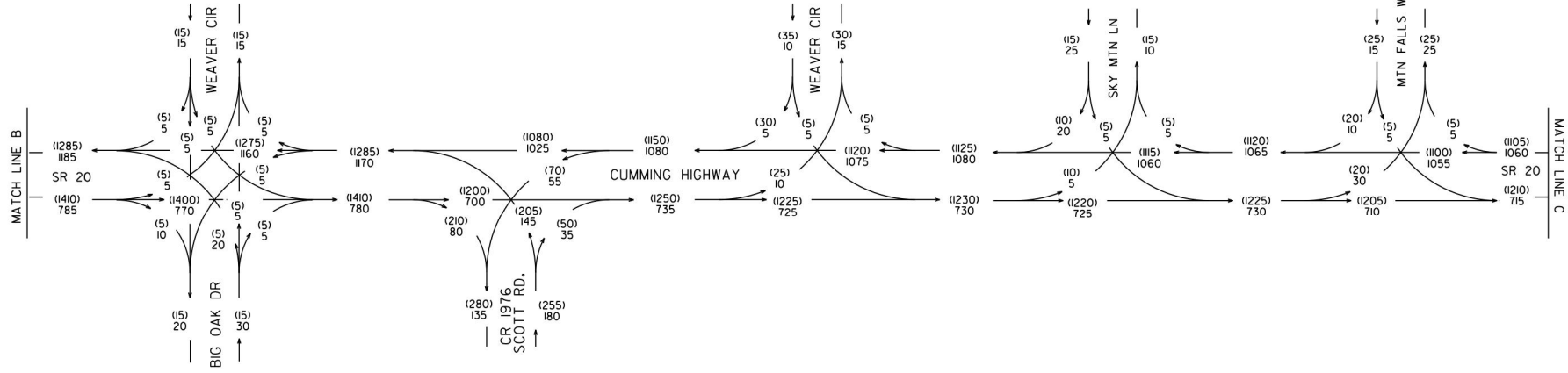
REVISION DATES	

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING NO.
10-19

DATE**	TIME**	PRF**	DC**	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
USER**		SPENTABLE**		GA	0003681	2	6

CHEROKEE COUNTY



CD
5/14

STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2025 NO BUILD PM DHV = (000)
2025 NO BUILD AM DHV = 000

GCA
GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH 404-355-4010 FAX 404-355-0604

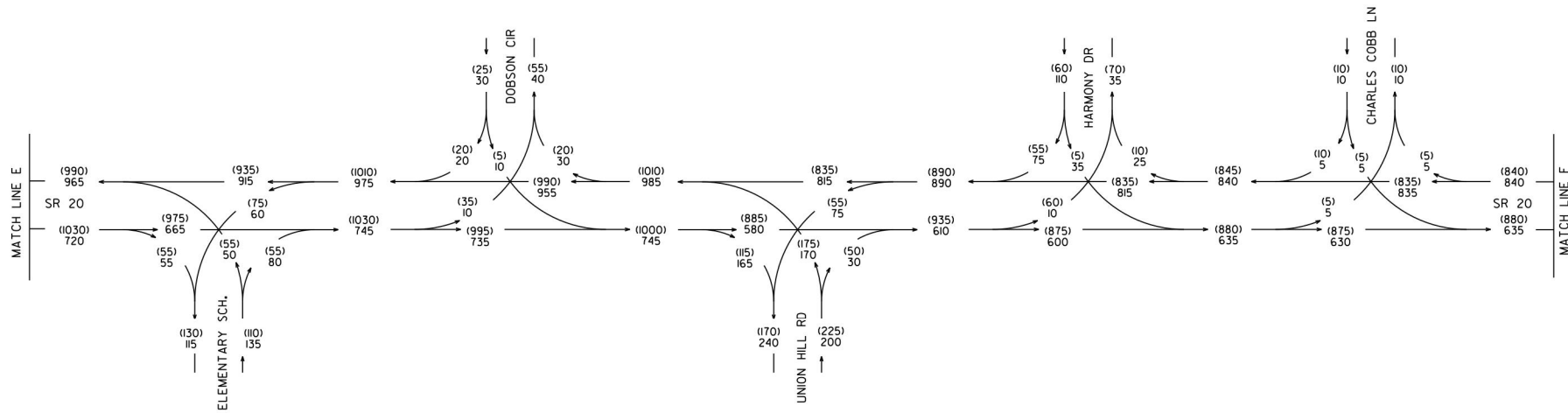
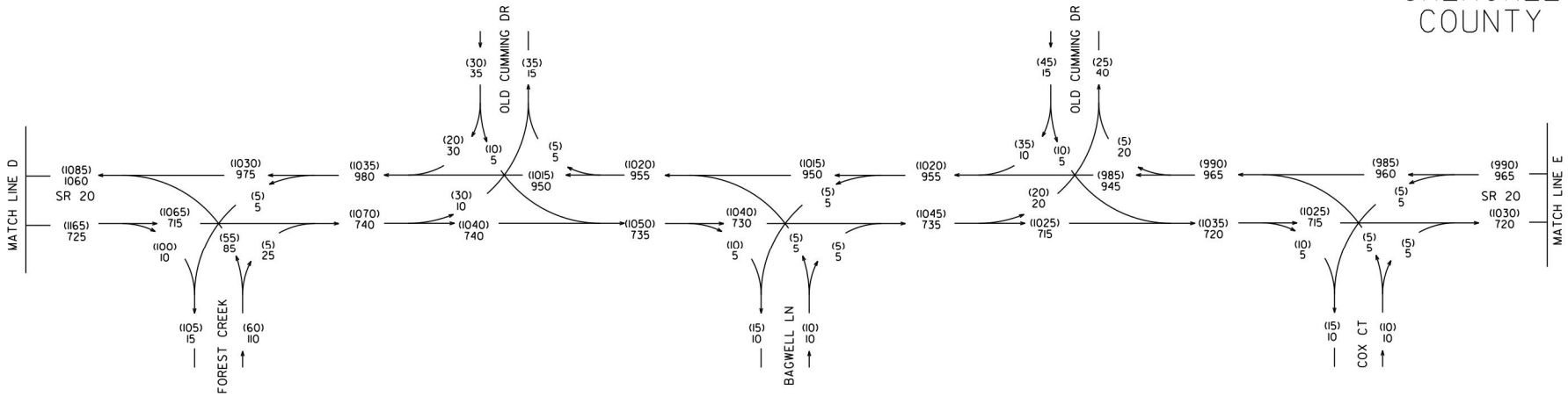
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S.U. = 7.5%
COMB. = 5%

REVISION DATES	

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING NO.
10-20

CHEROKEE COUNTY



CD
5/14

STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2025 NO BUILD PM DHV = (000)
2025 NO BUILD AM DHV = 000

GCA
CCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH 404-355-4000 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

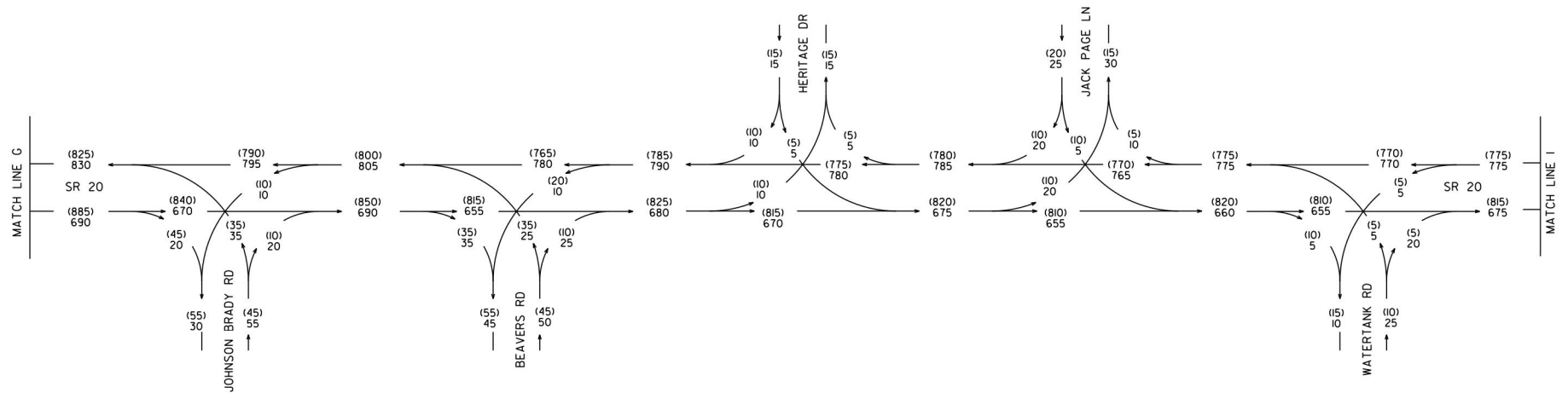
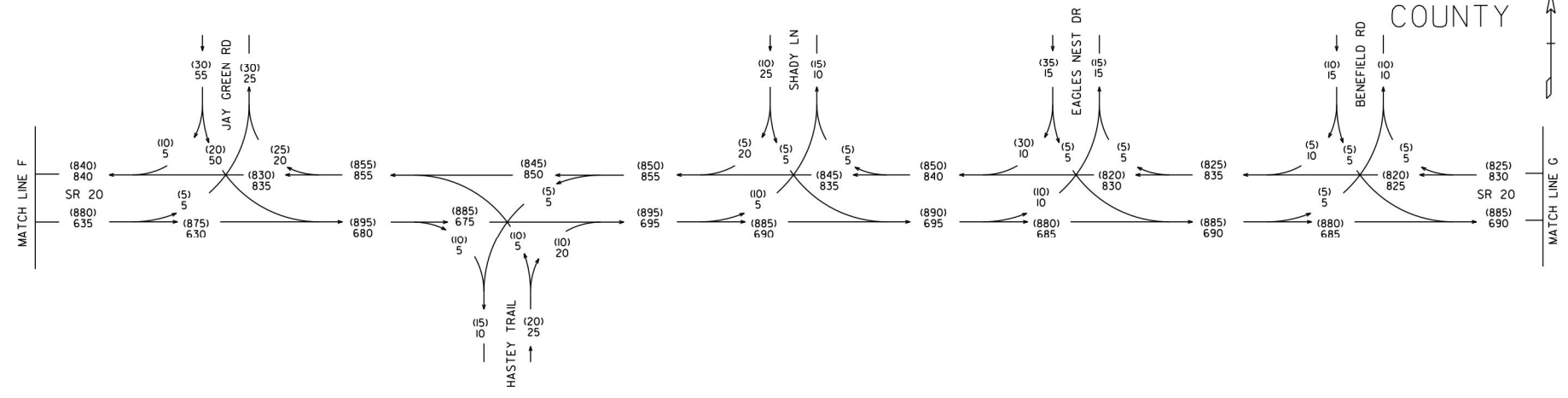
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING NO.

10-21

CHEROKEE COUNTY



CD
5/14

STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2025 NO BUILD PM DHV = (000)
2025 NO BUILD AM DHV = 000

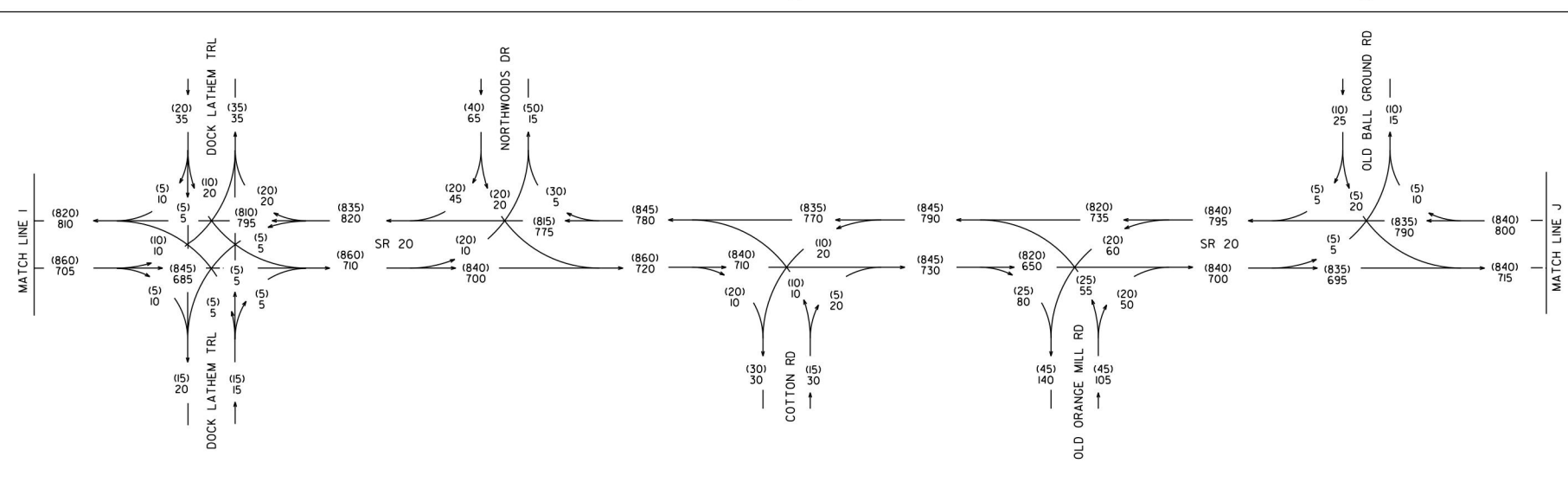
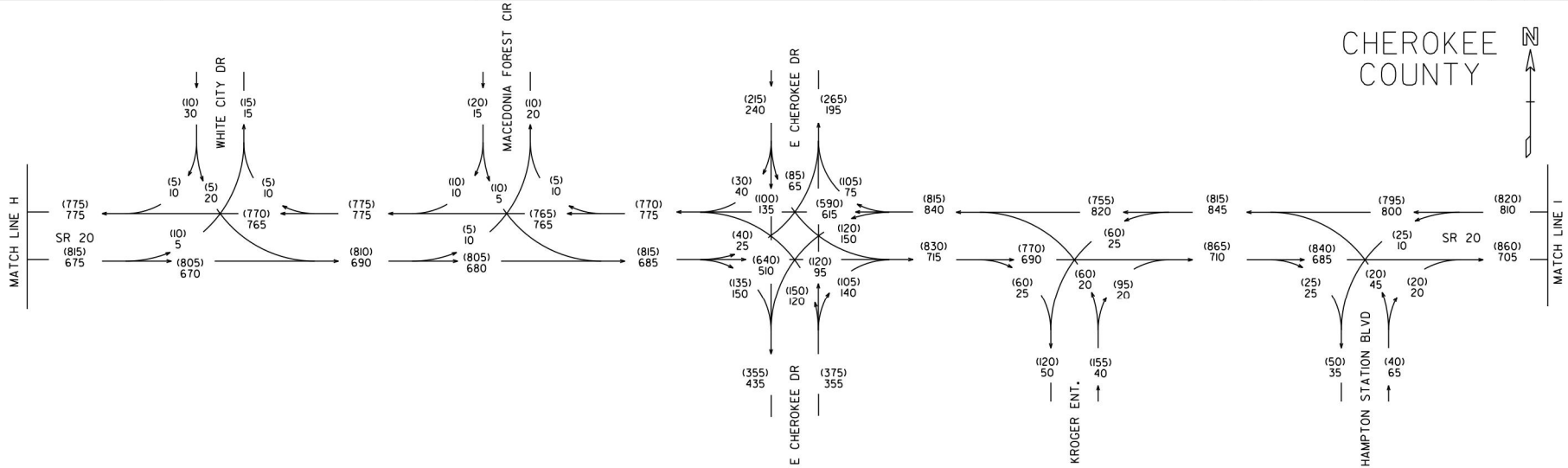
GCA
GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH: 404-355-4000 FAX: 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING NO.
10-22



STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2025 NO BUILD PM DHV = (000)
2025 NO BUILD AM DHV = 000

GCA
GCA, INC.
800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH: 404-355-4000 FAX: 404-355-0604

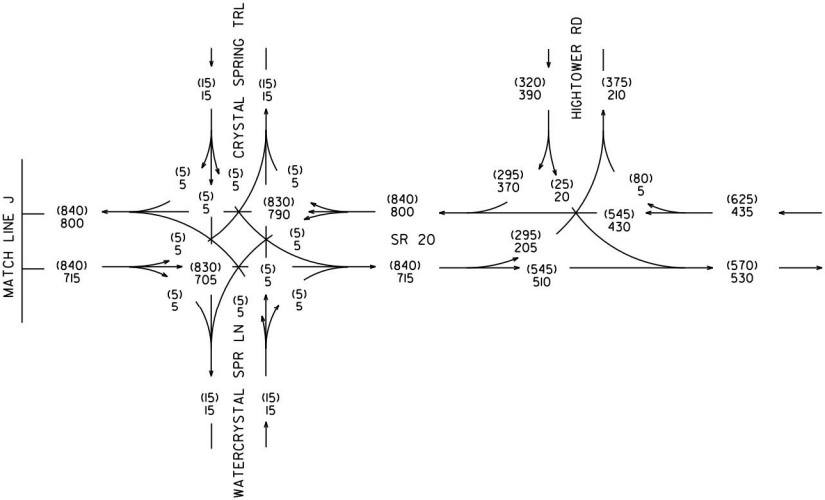
T = 12.5%
S.U. = 7.5%
COMB. = 5%

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

CD
5/14

DRAWING NO.
10-23



CHEROKEE
COUNTY

CD
5/14

STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2025 NO BUILD PM DHV = (000)
2025 NO BUILD AM DHV = 000

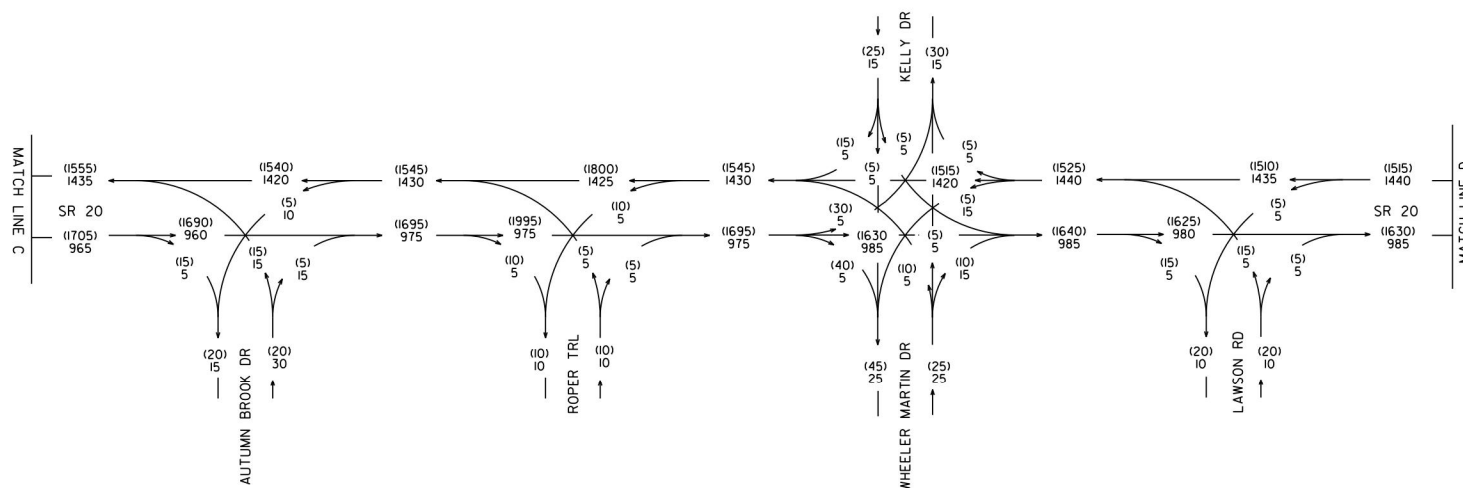
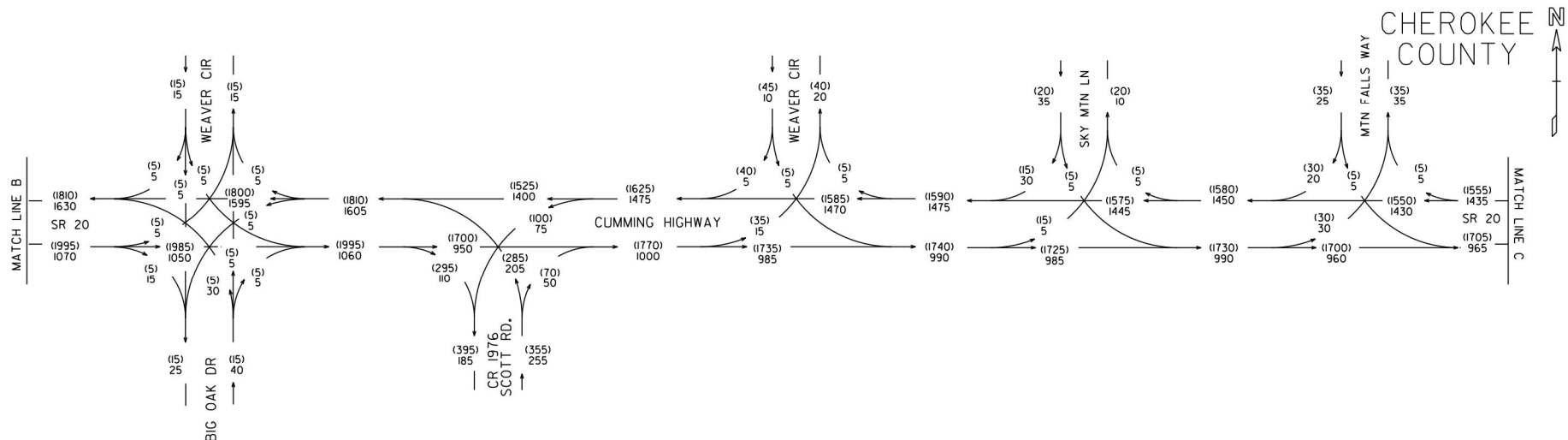
GCA
GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH: 404-355-4000 FAX: 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

REVISION DATES			STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION	
			OFFICE: PLANNING	
			TRAFFIC DIAGRAM	
			DRAWING NO.	
			10-24	

DRAWING No
10-25

DATE##	TIME##	PRF##	DOC##	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
000000	000000	000000	000000	GA	0003681	2	6



STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2045 NO BUILD PM DHV = (000)
2045 NO BUILD AM DHV = 000

GCA
GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH 404-355-4000 FAX 404-355-0604

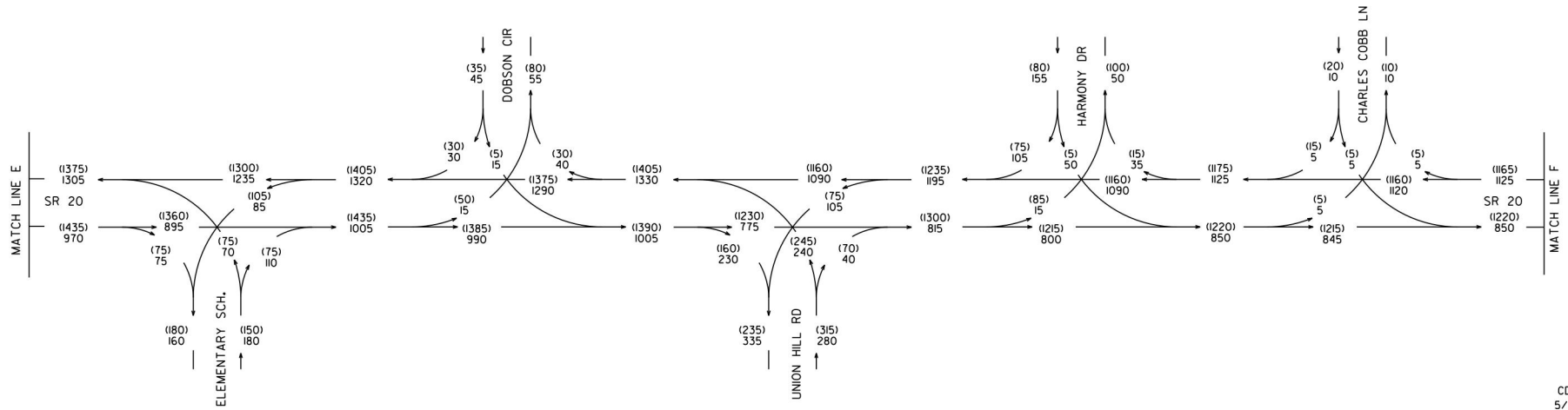
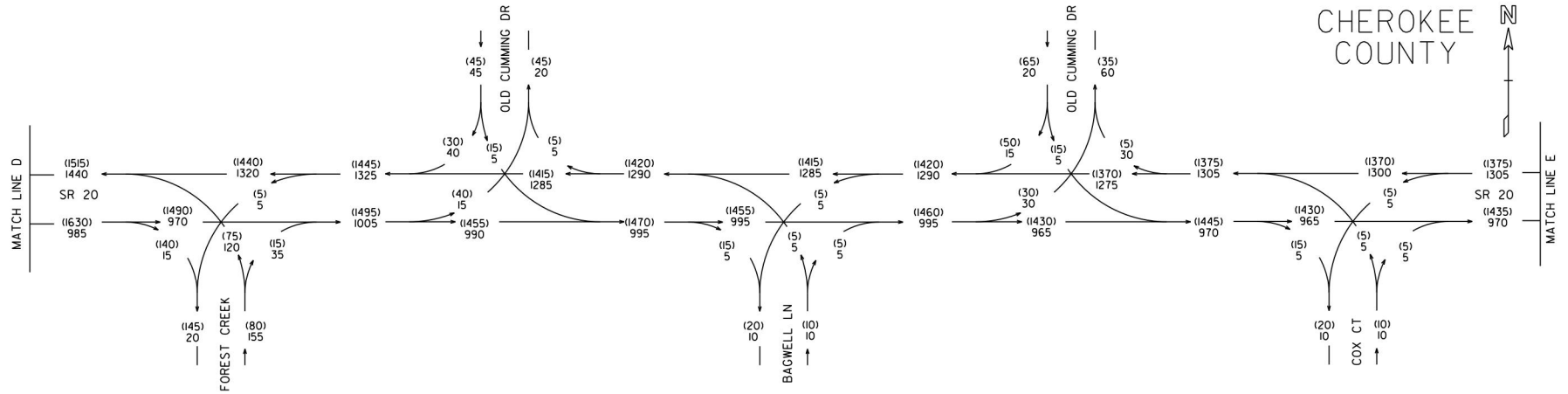
T = 12.5%
S.U. = 7.5%
COMB. = 5%

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING NO.
10-26

DATE**	TIME**	PRF**	DCG**	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
000000	000000	000000	000000	GA	0003681	3	6



STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2045 NO BUILD PM DHV = (000)
2045 NO BUILD AM DHV = 000

GCA
GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH 404-355-4000 FAX 404-355-0604

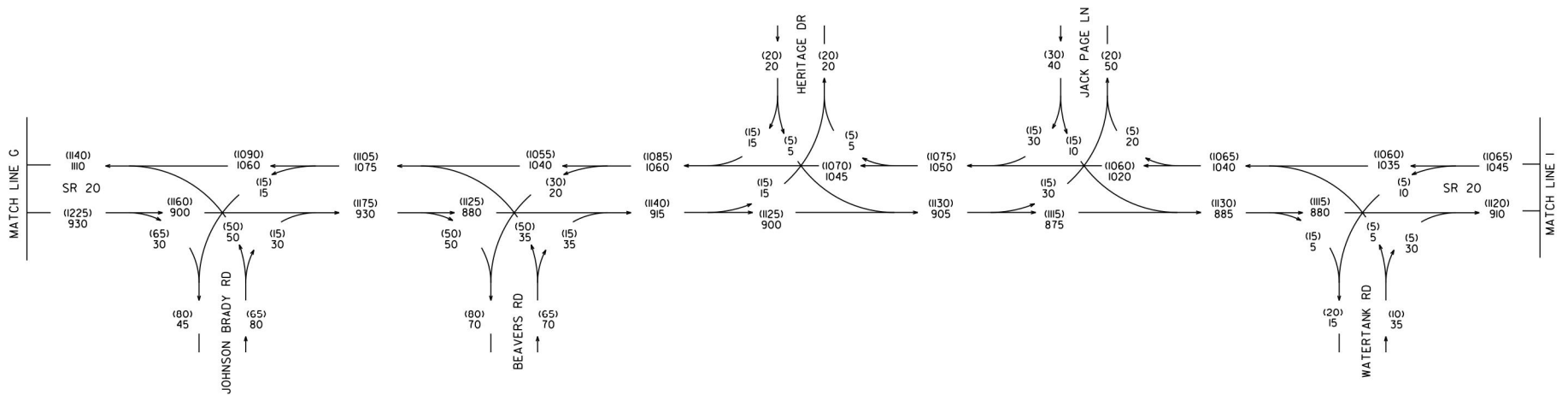
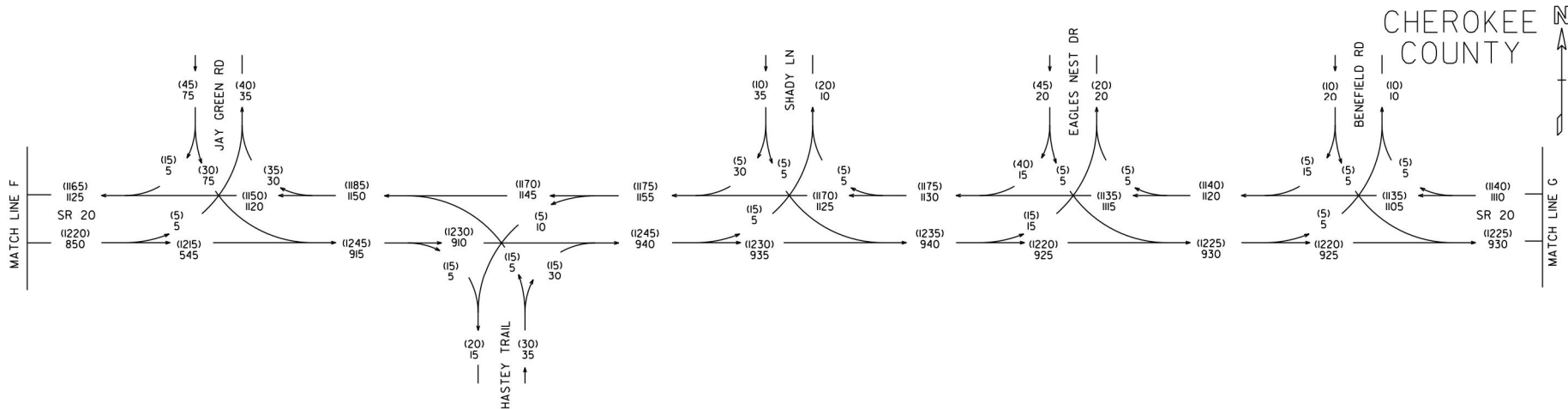
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S.U. = 7.5%
COMB. = 5%

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING NO.
10-27

DATE##	TIME##	PRF##	DCW#	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
USER#		SPENTABLE##		GA	0003681	4	6



STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2045 NO BUILD PM DHV = (000)
2045 NO BUILD AM DHV = 000

GCA INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH: 404-355-4000 FAX: 404-355-0604

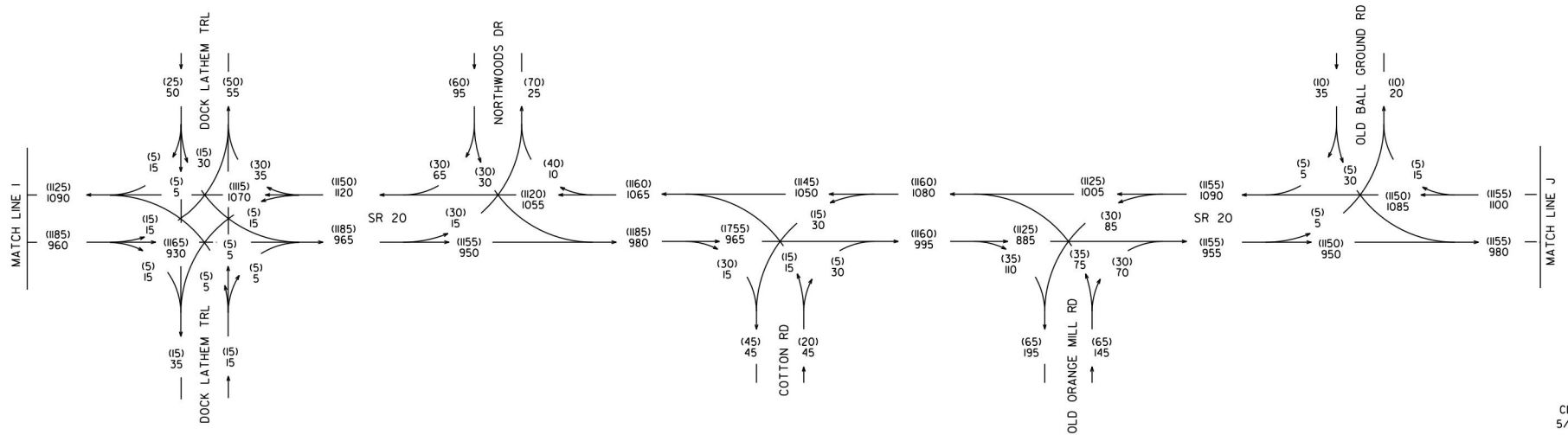
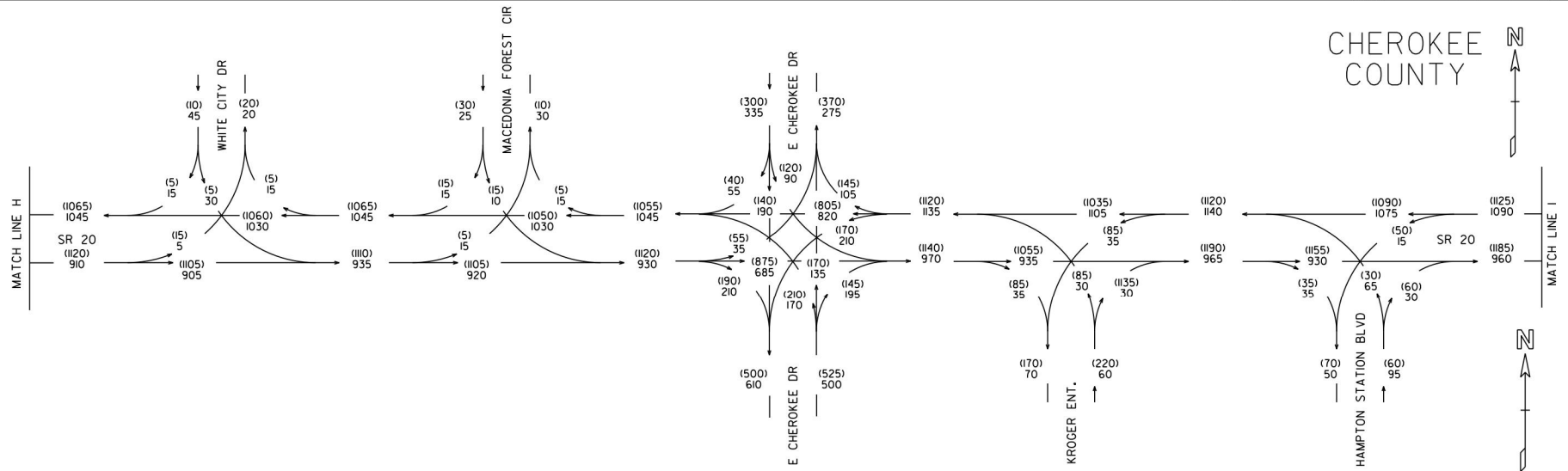
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S.U. = 7.5%
COMB. = 5%

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING NO.
10-28

CD
5/14



STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2045 NO BUILD PM DHV = (000)
2045 NO BUILD AM DHV = 000

GCA GCA, INC.
800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4000 FAX 404-355-0604

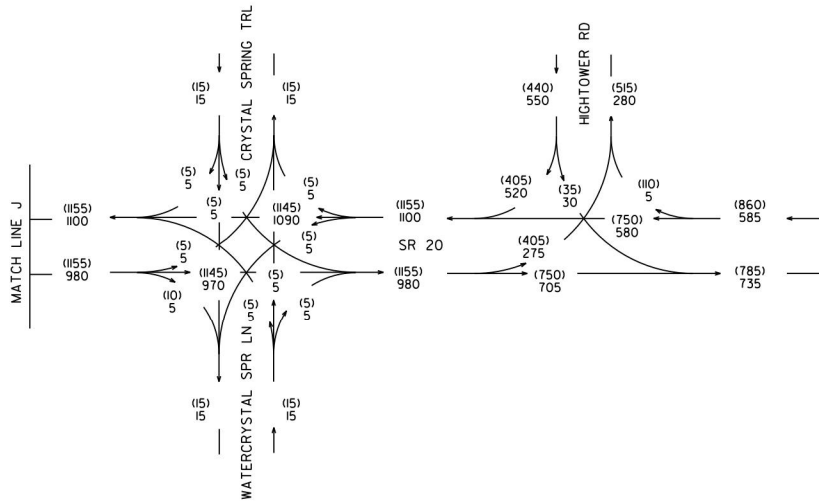
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COMB. = 5%

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING NO.
10-29

CD
5/14



CHEROKEE COUNTY

N

CD
5/14

STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2045 NO BUILD PM DHV = (000)
2045 NO BUILD AM DHV = 000

GCA
GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH 404-355-4000 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

REVISION DATES

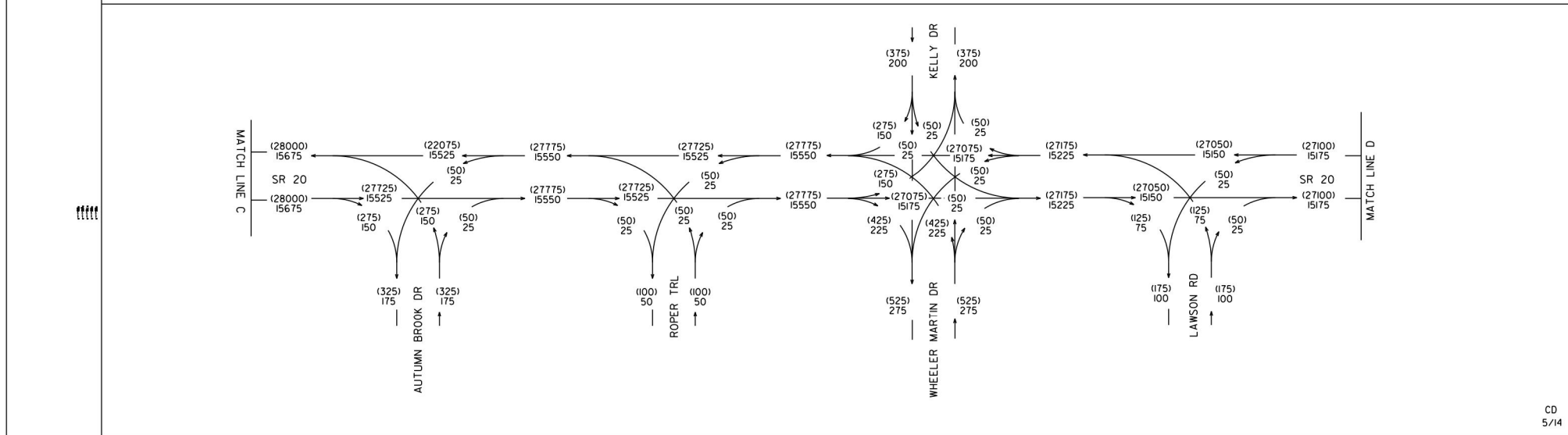
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DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING NO.
10-30

12/14/2002 09:11 10-51



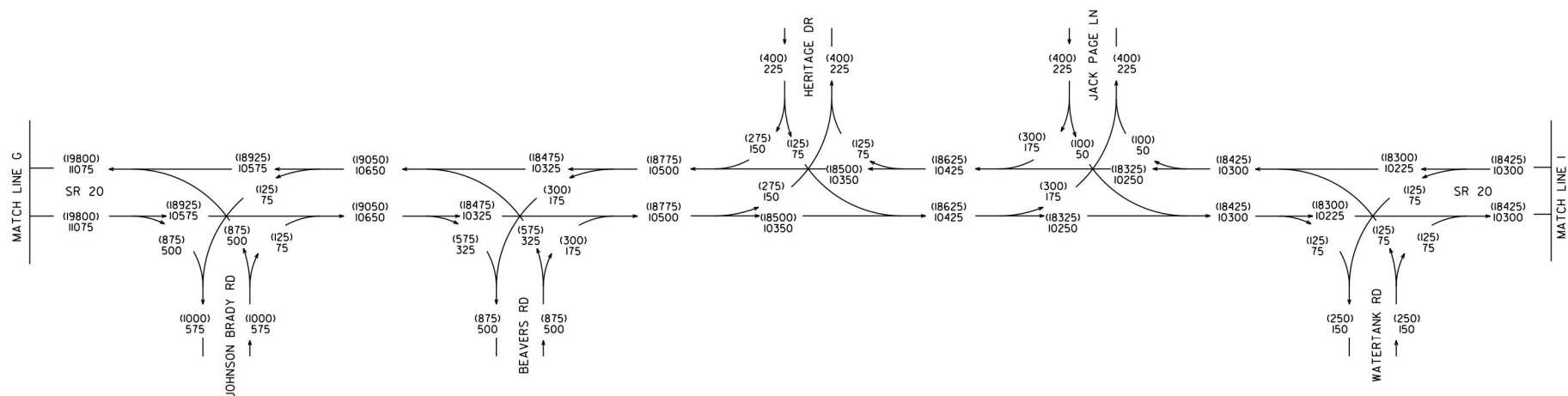
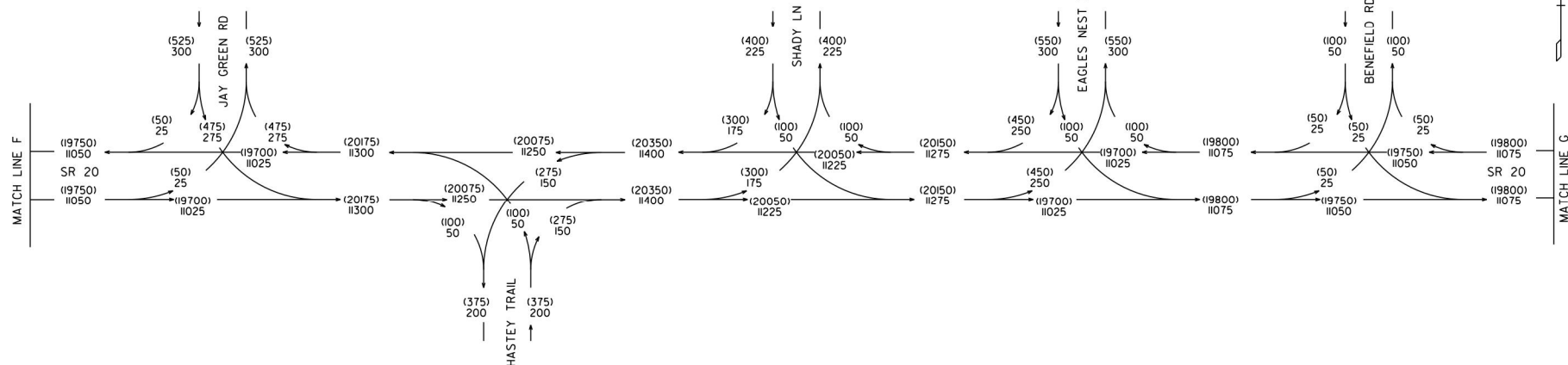
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10-31



DRAWING No.
10-32

DATE##	TIME##	PRF##	DCN##	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
USERS		SPENTABLE##		GA	0003681	4	6

CHEROKEE COUNTY



CD
5/14

STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2045 BUILD ADT = (000)
2025 BUILD ADT = 000

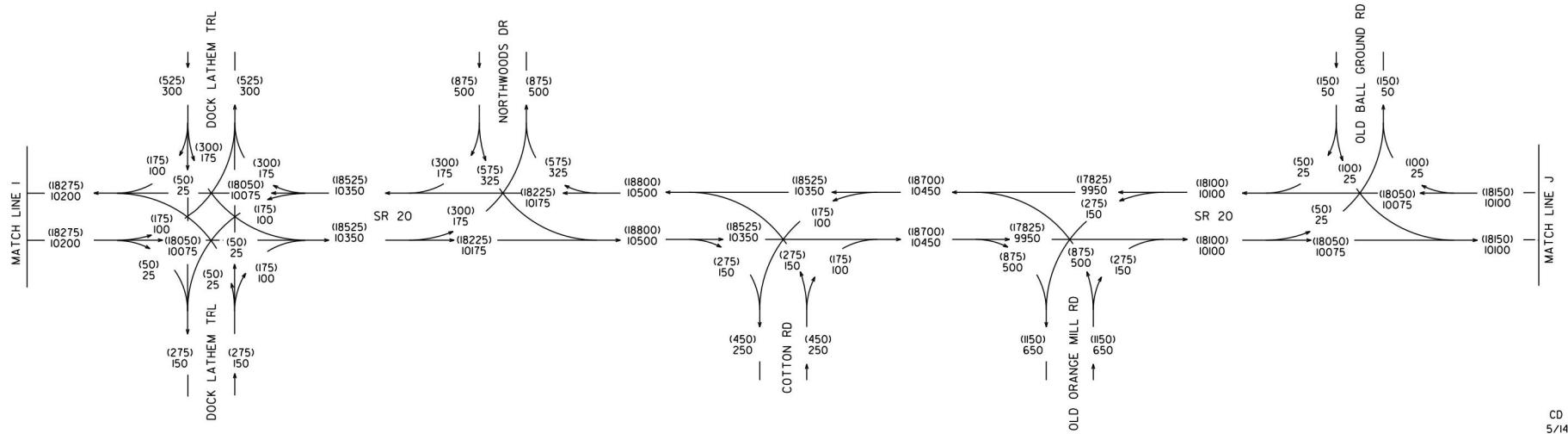
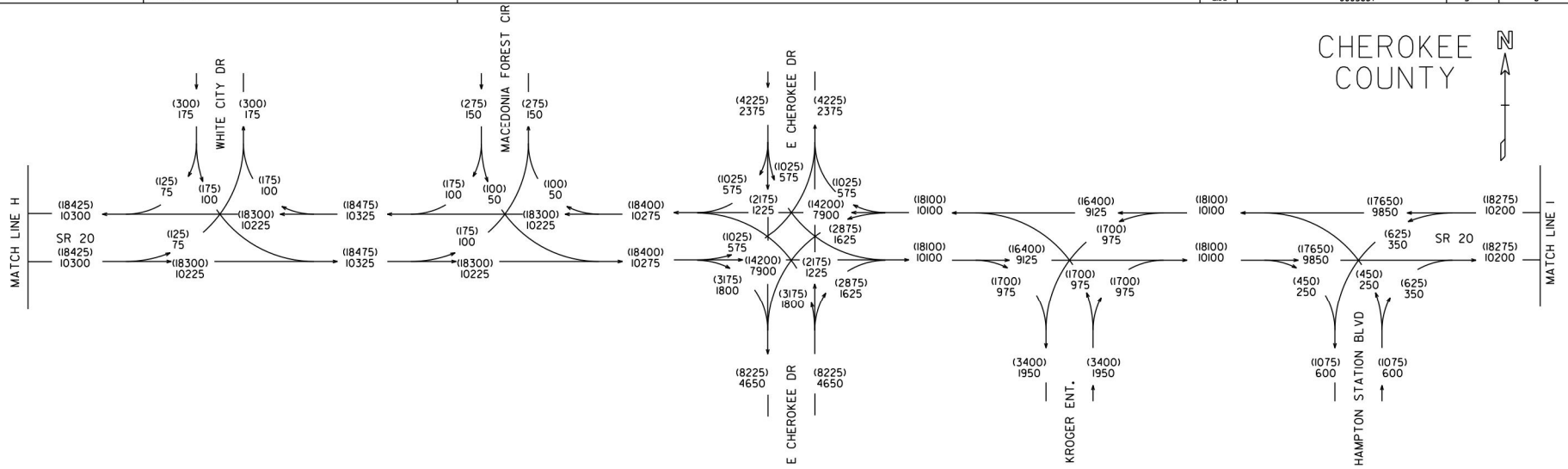
GCA GCA, INC.
800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH: 404-355-4000 FAX: 404-355-0604

24 HOURS T = 16%
S.U. = 10%
COMB. = 6%

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING NO.
10-34



STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2045 BUILD ADT = (000)
2025 BUILD ADT = 000

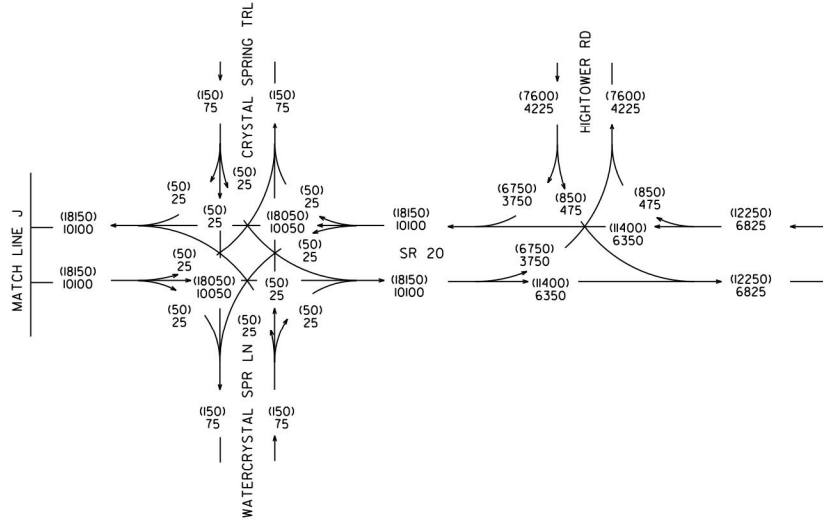
GCA GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4000 FAX 404-355-0604

24 HOURS T = 16%
S.U. = 10%
COMB. = 6%

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No.
10-35



CHEROKEE
COUNTY

N

CD
5/14

STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2045 BUILD ADT = (000)
2025 BUILD ADT = 000

GCA
GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH: 404-355-4000 FAX: 404-355-0604

24 HOURS T = 16%
S.U. = 10%
COMB. = 6%

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No.

10-36

CHEROKEE COUNTY

N

MATCH LINE A

MATCH LINE B

CD 5/14

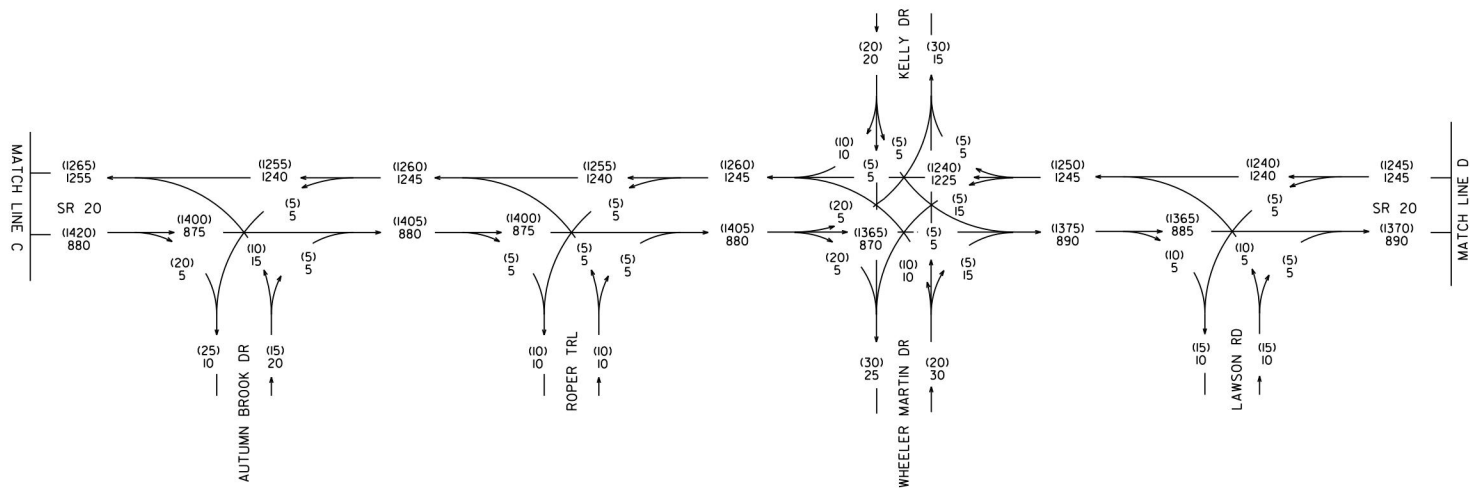
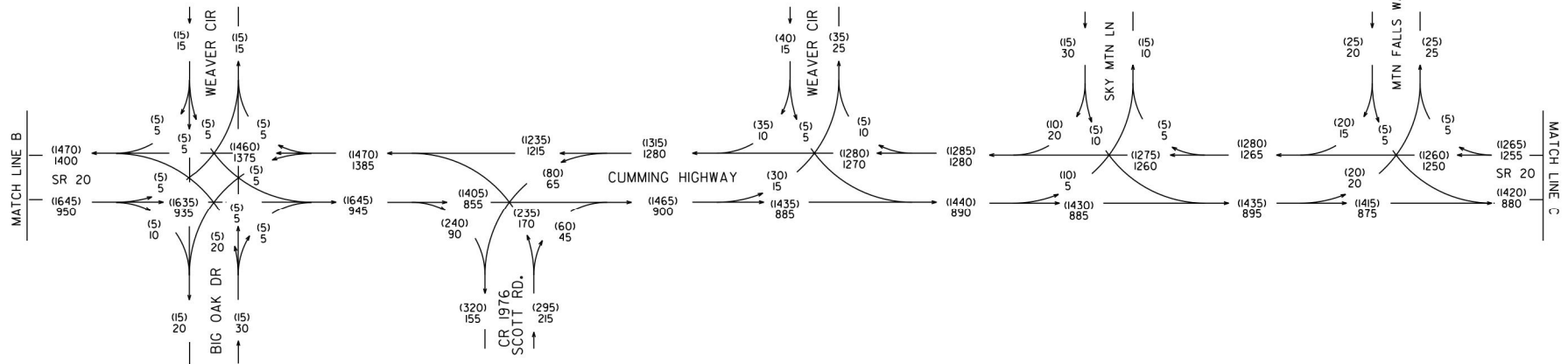
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GCA GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4010 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

REVISION DATES			STATE OF GEORGIA	
			DEPARTMENT OF TRANSPORTATION	
			OFFICE: PLANNING	
			TRAFFIC DIAGRAM	
			DRAWING NO.	
			10-37	

CHEROKEE COUNTY



CD
5/14

STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2025 BUILD PM DHV = (000)
2025 BUILD AM DHV = 000

GCA
GCA, INC.
800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH: 404-355-4000 FAX: 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

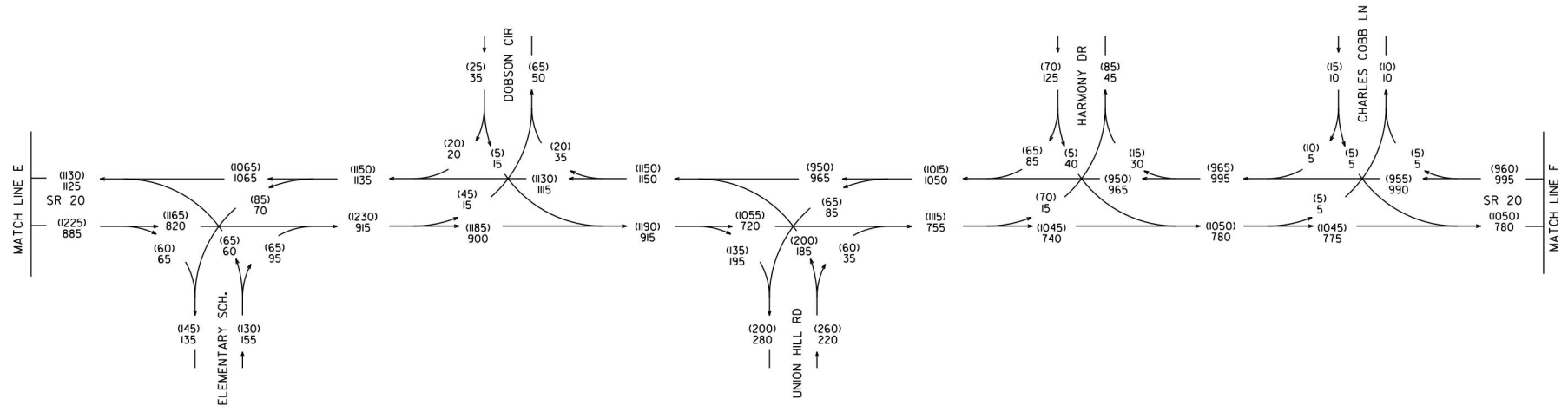
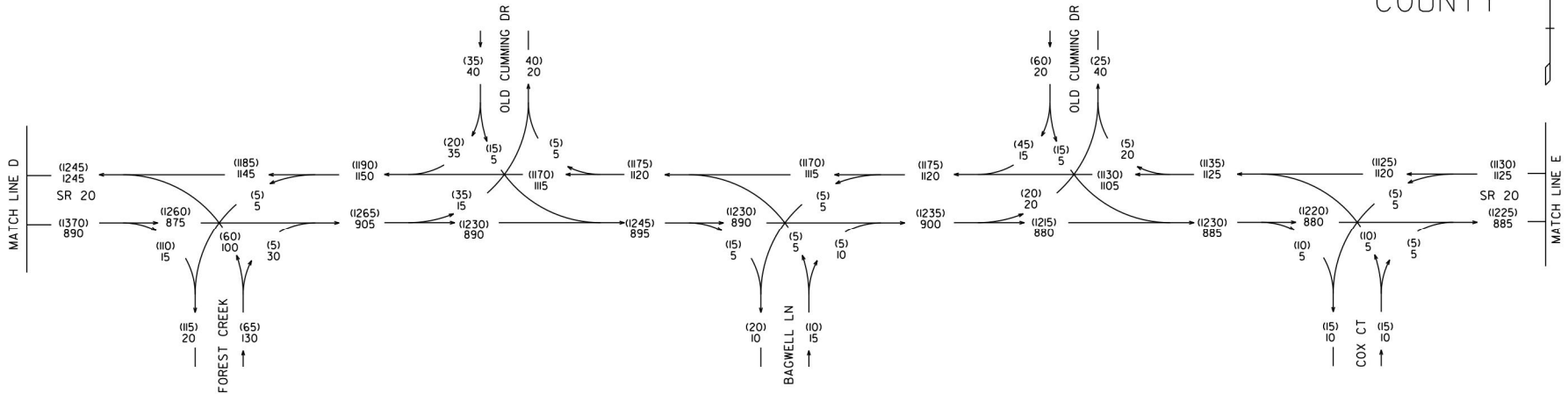
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING NO.
10-38

CHEROKEE COUNTY

N



STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2025 BUILD PM DHV = (000)
2025 BUILD AM DHV = 000

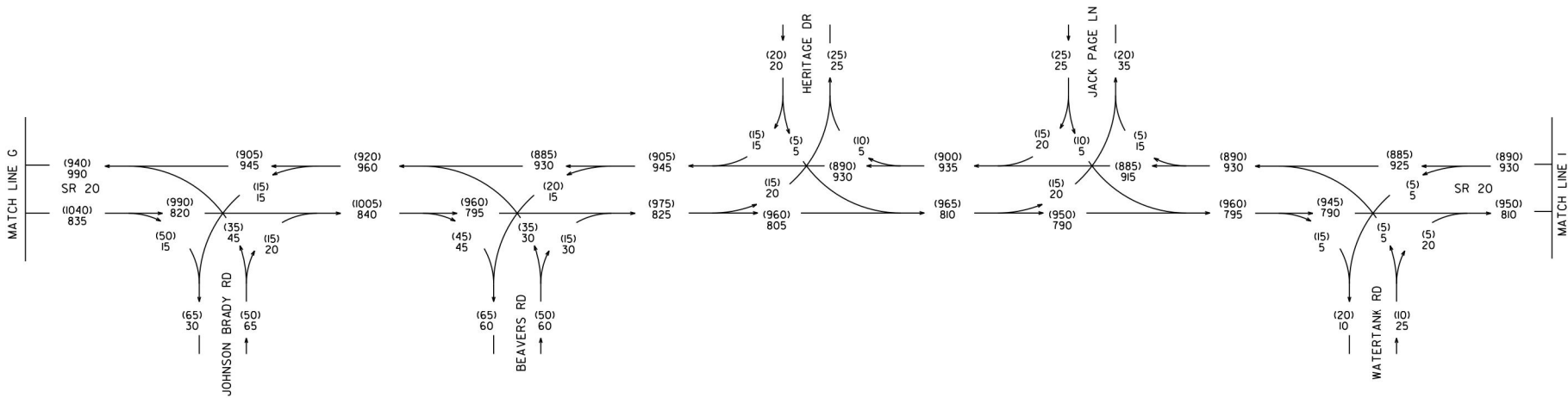
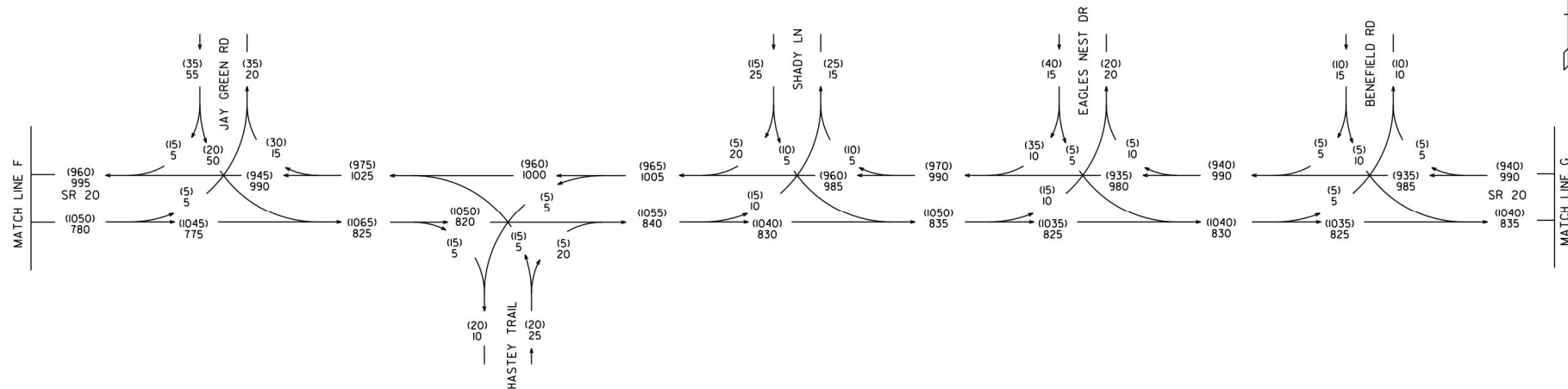
GCA GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH: 404-355-4000 FAX: 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

REVISION DATES			STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION	
			OFFICE: PLANNING	
			TRAFFIC DIAGRAM	
			DRAWING No. 10-39	

DATE##	TIME##	PRF##	DCN##	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
USER#		SPENTABLE##		GA	0003681	4	6

CHEROKEE COUNTY



CD
5/14

STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2025 BUILD PM DHV = (000)
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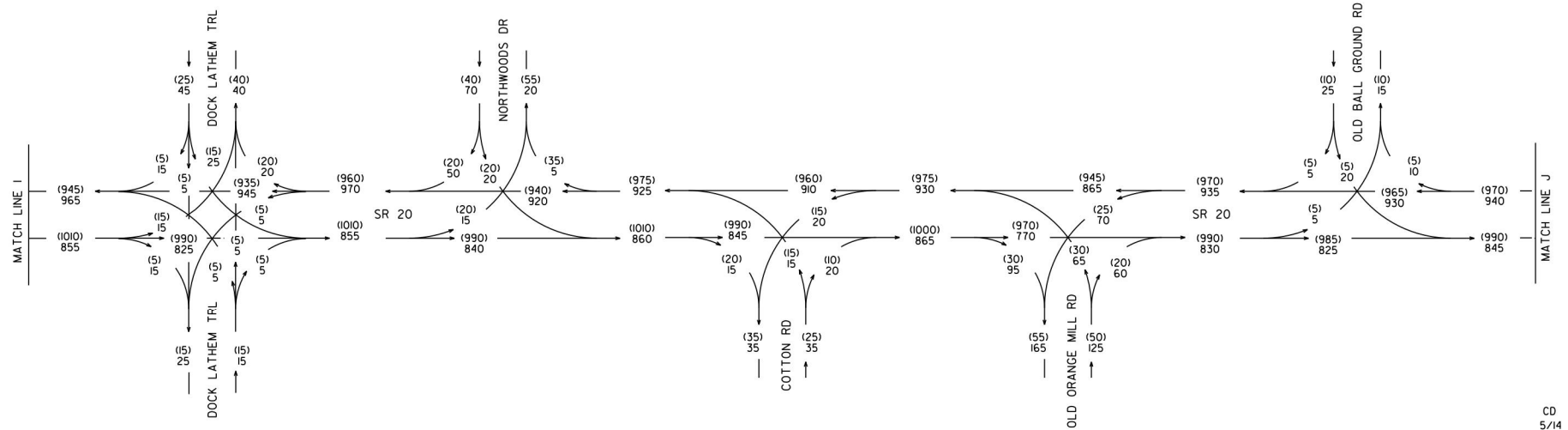
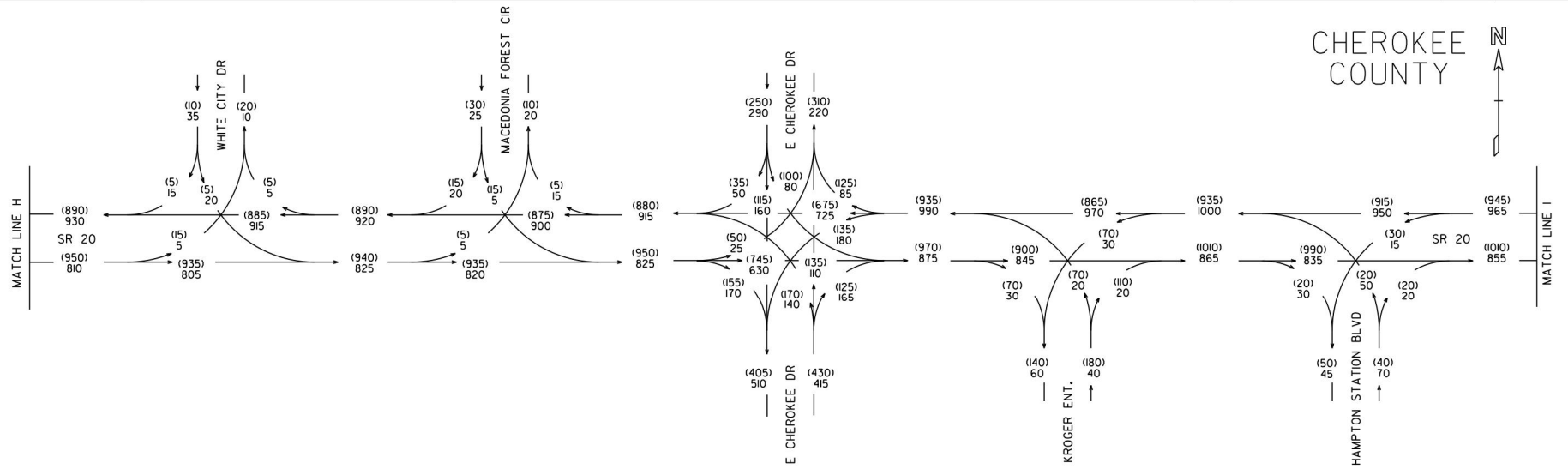
GCA
GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH 404-355-4000 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING NO.
10-40



STP00-0003-00(681)
P.I.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2025 BUILD PM DHV = (000)
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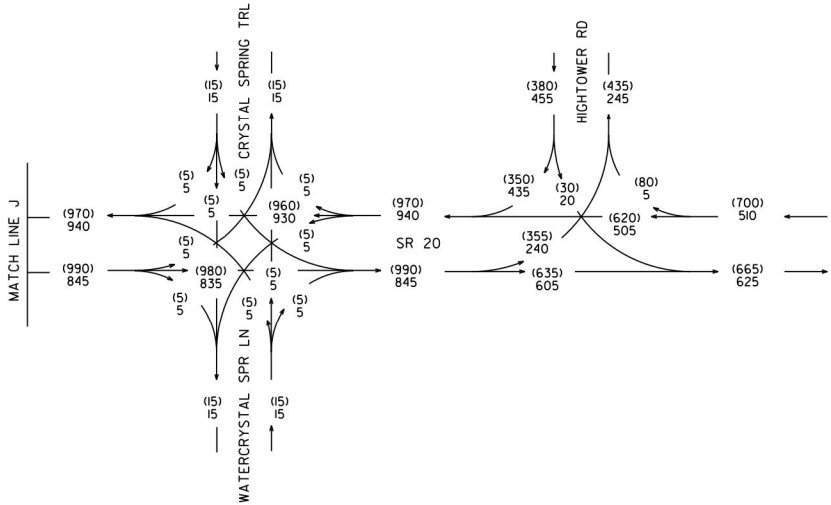
GCA GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH. 404-355-4000 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING No.
10-41



CHEROKEE
COUNTY

N

CD
5/14

STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2025 BUILD PM DHV = (000)
2025 BUILD AM DHV = 000

GCA GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH: 404-355-4000 FAX: 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

REVISION DATES

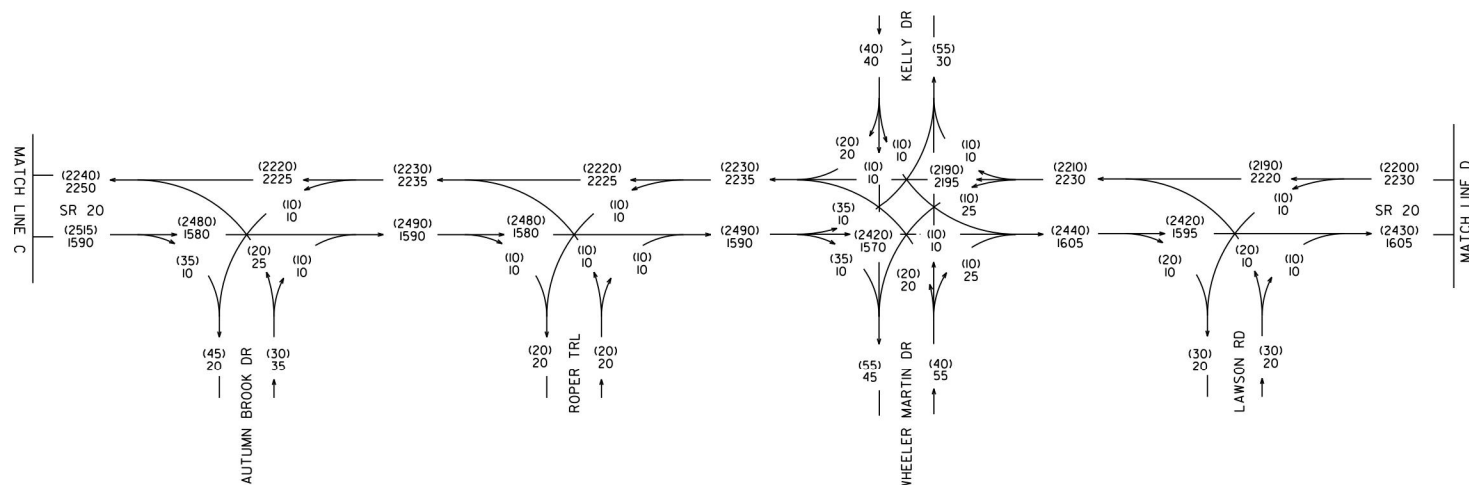
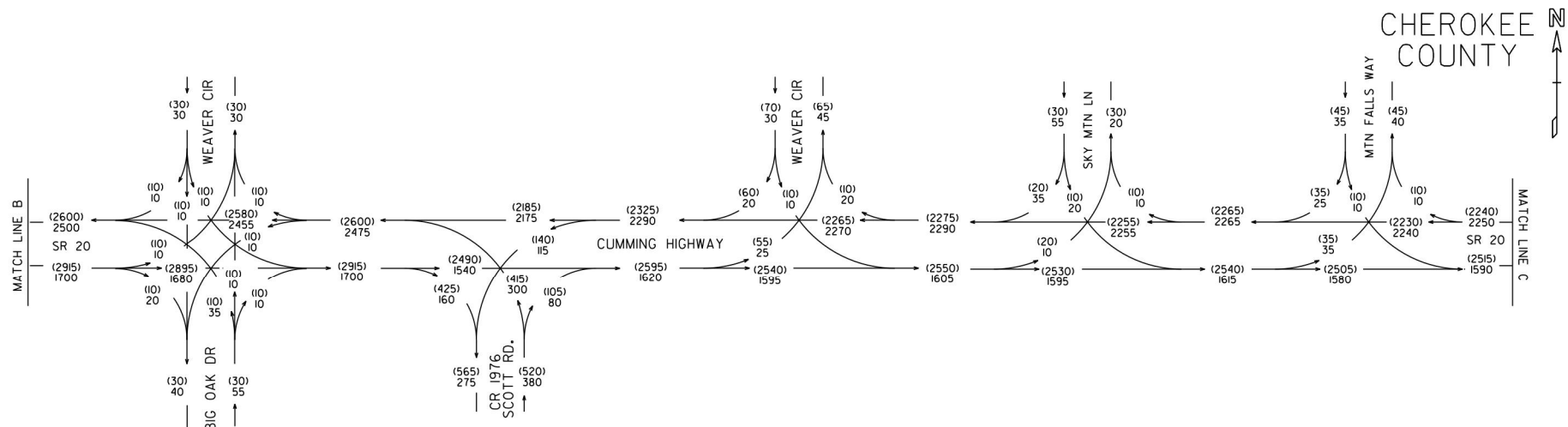
STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING NO.
10-42



DRAWING No.
10-43

DATE##	TIME##	SPRFS	DOG#	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
#USER#		##PENTABLE##		GA	0003681	2	6



STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2045 BUILD PM DHV = (000)
2045 BUILD AM DHV = 000

GCA
GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH: 404-355-4000 FAX: 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

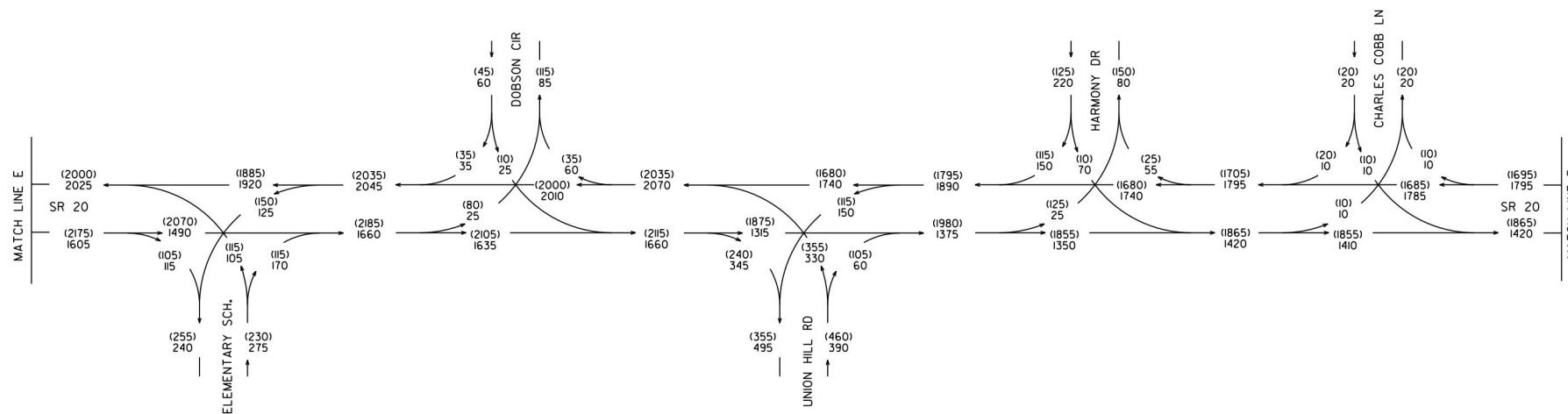
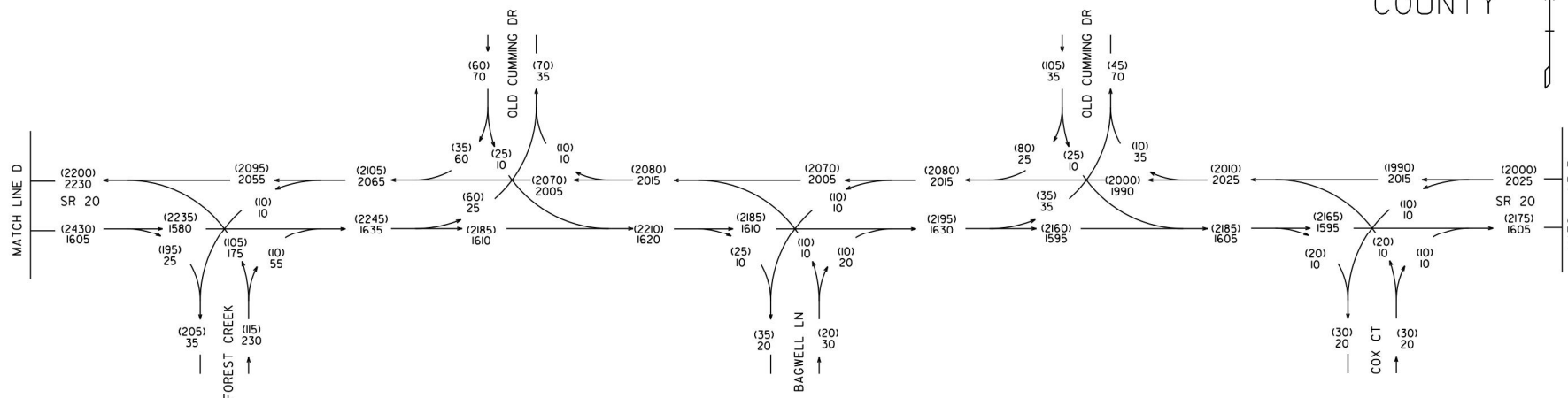
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

CD
5/14

DRAWING No.
10-44

CHEROKEE
COUNTY



CD
5/14

STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2045 BUILD PM DHV = (000)
2045 BUILD AM DHV = 000

GCA
GCA, INC.
800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH 404-355-4000 FAX 404-355-0604

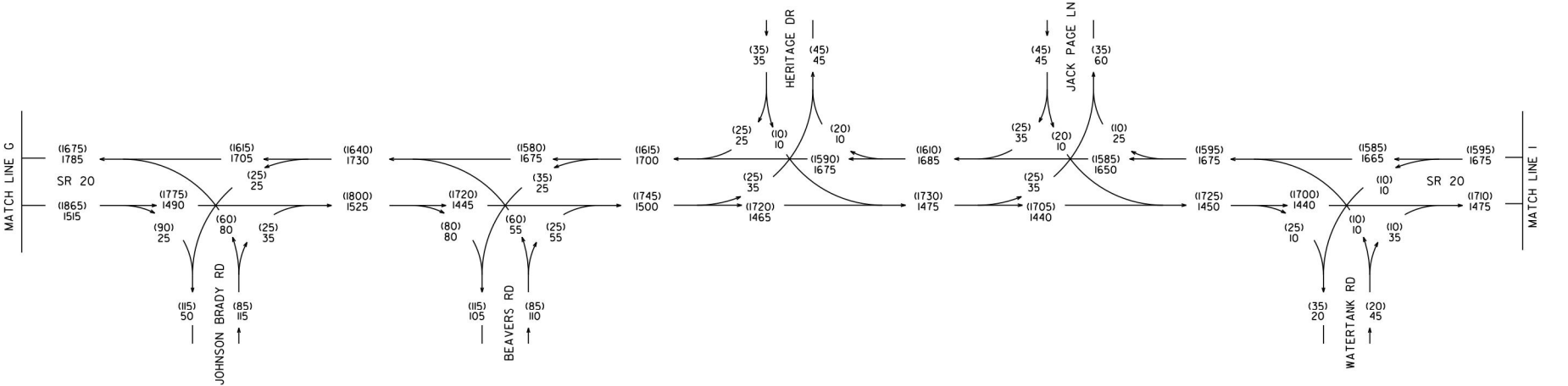
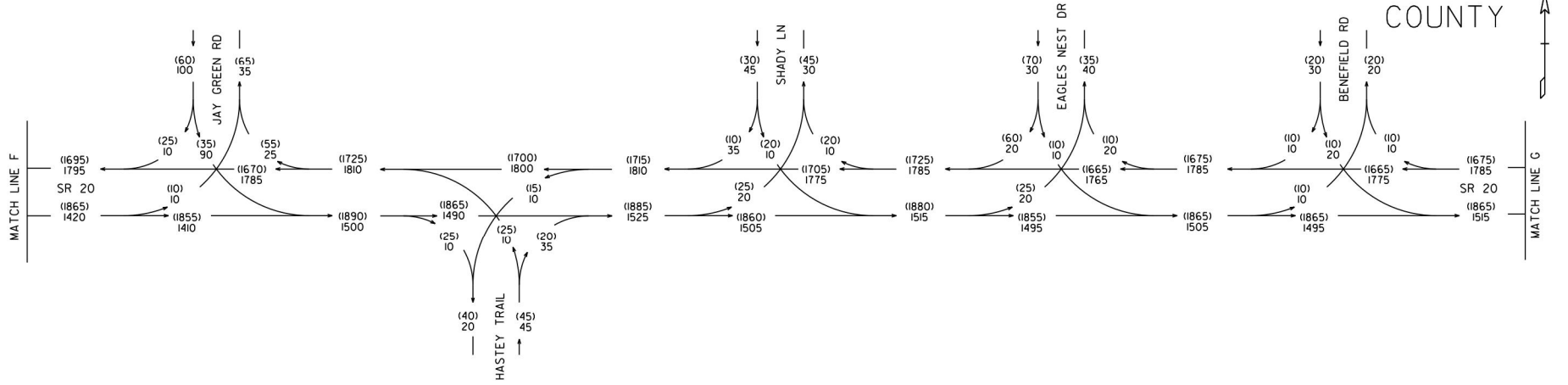
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REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING NO.
10-45

CHEROKEE COUNTY



CD
5/14

STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2045 BUILD PM DHV = (000)
2045 BUILD AM DHV = 000

GCA
GCA, INC.
800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH 404-355-4000 FAX 404-355-0604

T = 12.5%
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COMB. = 5%

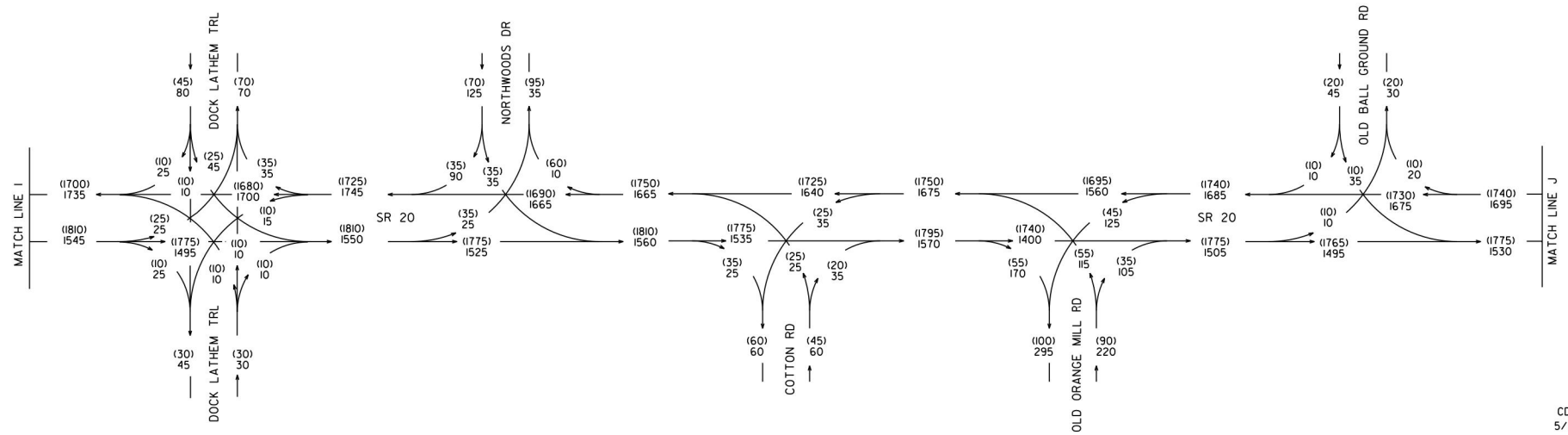
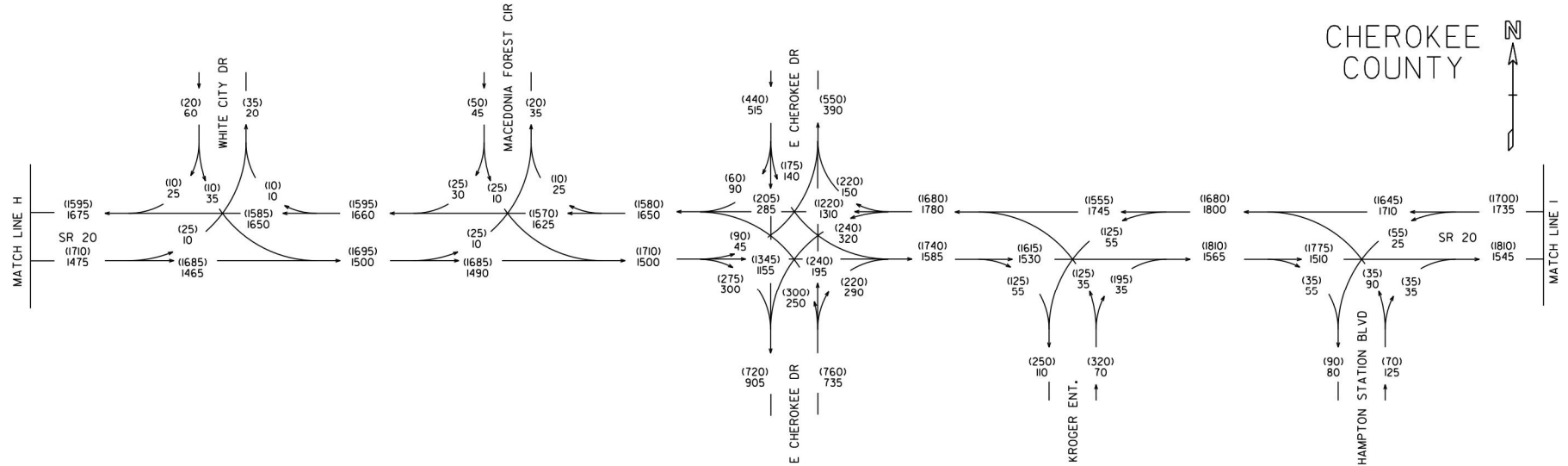
REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING NO.

10-46

DATE##	TIME##	PRF##	DOC##	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
USER#		SPENTABLE##		GA	0003681	5	6



STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2045 BUILD PM DHV = (000)
2045 BUILD AM DHV = 000

GCA GCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH: 404-355-4000 FAX: 404-355-0604

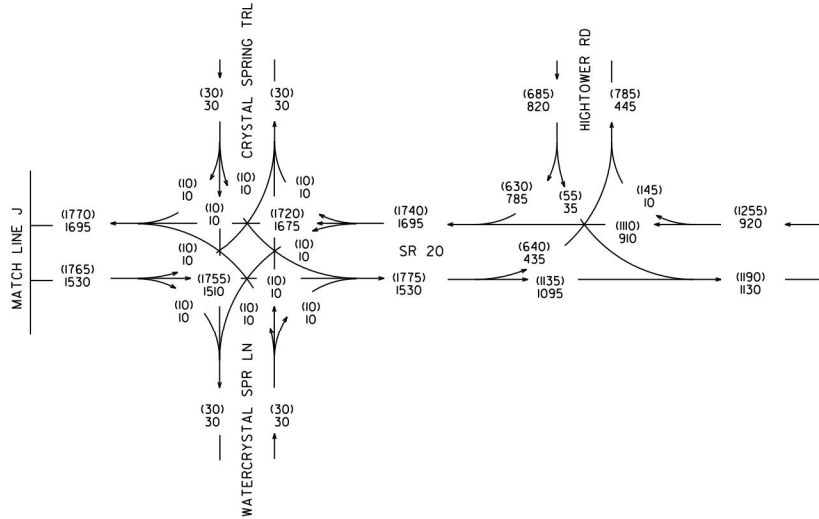
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S.U. = 7.5%
COMB. = 5%

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING NO.
10-47

CD
5/14



CHEROKEE COUNTY

N

CD
5/14

STP00-0003-00(681)
P.J.# 0003681
CHEROKEE COUNTY
S.R. 20
FM I-575 TO SR369

2045 BUILD PM DHV = (000)
2045 BUILD AM DHV = 000

GCA
CCA, INC.
1800 PEACHTREE STREET, N.W.
SUITE 825
ATLANTA, GEORGIA 30309
PH 404-355-4000 FAX 404-355-0604

T = 12.5%
S.U. = 7.5%
COMB. = 5%

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: PLANNING
TRAFFIC DIAGRAM

DRAWING NO.
10-48

Attachment 6

Roundabout Data

Dunnahoo, Lindsey

From: Law, Nicole <nlaw@dot.ga.gov>
Sent: Tuesday, August 30, 2016 5:55 PM
To: Gero, Scott
Cc: Dunnahoo, Lindsey; Wood, Jeff
Subject: FW: Request confirmation that GDOT does not consider roundabouts on 6-lane arterials - SR 20 Corridor

Scott,
Please see the recommendation below in regards to your concerns about considering a roundabout in the 6-lane sections.

Thanks,

Nicole S Law

Phone: (404) 631-1723

Mobile: (404) 807-7424

From: Barry, Christina
Sent: Tuesday, August 30, 2016 5:14 PM
To: Law, Nicole
Cc: Zehngraff, Scott E.
Subject: RE: Request confirmation that GDOT does not consider roundabouts on 6-lane arterials - SR 20 Corridor

Hi Nicole,

We agree that the consultant does not need to consider roundabouts in the six lane section. However, we would recommend that they consider restricted crossing u-turns or median u turns as possible alternatives for these intersections. Please let me know if you have any additional questions.

Thanks!

Christina D. Barry, PE
Traffic Operations Supervisor
Office of Traffic Operations
Georgia Department of Transportation
935 E. Confederate Avenue, Bldg. 24
Atlanta, GA 30316
cbarry@dot.ga.gov
Phone: (404) 635-2922

From: Law, Nicole
Sent: Wednesday, August 24, 2016 5:25 PM
To: Barry, Christina
Subject: FW: Request confirmation that GDOT does not consider roundabouts on 6-lane arterials - SR 20 Corridor

Christina,
Is this your area of expertise or does it go to Design Policy & Support? Do you mind pointing me in the right direction to answer the concerns of my consultant below?

Thanks,

Nicole S Law

Phone: (404) 631-1723

Mobile: (404) 807-7424

From: Gero, Scott [<mailto:Scott.Gero@aecom.com>]

Sent: Wednesday, August 24, 2016 3:59 PM

To: Law, Nicole

Cc: Dunnahoo, Lindsey; Wood, Jeff

Subject: Request confirmation that GDOT does not consider roundabouts on 6-lane arterials - SR 20 Corridor

Nicole,

Can you reach out to Scott Zehngraft or whoever is appropriate to confirm that we do not need to evaluate or consider roundabouts on a 6-lane arterial? I understand according to Chapter 8 of the DPM that if we have an ADT that exceeds 45,000 vehicles, then we no longer need to consider a multi-lane roundabout. This is the case from Scott Rd to Union Hill Road. However, east of Union Hill Rd to SR 369, we are proposing 6 lanes with an ADT less than 45,000 in our design year. Therefore, before we advance the concept report and not address or evaluate roundabouts in our 6-lane section, I just want to make sure that GDOT Traffic agrees that roundabouts do not need to be considered for 6-lane sections.

For a roundabout to be a reasonable solution, the opening and design year volumes for traffic entering the roundabout from the major road should be less than 90% of the total volume entering the roundabout.

Table 8.1. Planning-level Thresholds for Single-Lane and Two-Lane Roundabouts

No. of Circulatory Lanes	ADT ¹ (design year)	% Traffic on Major Road (opening & design year)
Single-lane	< 25,000	< 90
Two-lane	< 45,000	< 90

¹Based on traffic entering the circulatory roadway for a four-leg roundabout. A reasonable approximation for a three-leg roundabout is 75% of the values shown above.

²The volume of traffic entering the roundabout from the major road divided by the total traffic volume entering the roundabout, as a percentage.

If traffic volumes exceed the maximum ADT thresholds shown in Table 2.1 (i.e., 45,000 or more) or if site conditions are unfavorable to a roundabout, an acceptable conventional intersection may be selected without further evaluation. Nevertheless, a roundabout may still operate better than a conventional intersection and may be carried forward for more detailed consideration of a roundabout feasibility study.

Thank you,

Scott A. Gero, P.E.

Project Manager

SR 20 Improvements from Canton to Cumming

PI No's: 0014131, 0014132, 0014133, 0002862, 0003682

<http://www.dot.ga.gov/BuildSmart/Projects/Pages/1575SR400.aspx>

AECOM

400 Northpark Town Center
1000 Abernathy Rd. NE, Suite 900
Atlanta, GA 30328
T 678.808.8800 F 678.808.8400
www.aecom.com

It's Georgia Department of Transportation's centennial! We were founded on August 16, 1916. The Department's work over the last century has contributed to a treasured quality of life for Georgians and to the incredible economic development of the Peach State. Georgia DOT has served for 100 years with simply the best in safety, service and innovation. And we will continue to embrace change, encourage innovation, meet new challenges and break new barriers as the next hundred years unfold. For all things Centennial, visit www.dot.ga.gov/Centennial.

Attachment 7

S I & A Report

Bridge Inventory Data Listing Georgia Department of Transportation

Processed Date:3/9/2017

Parameters: Bridge Serial Number

Bridge Serial Number: 057-0014-0

County: Cherokee

SUFF. RATING: 93.8

Location & Geography

Structure ID: 057-0014-0
 200 Bridge Information: 02
 *6 Feature Intersected: SMITHWICK CREEK
 *7A Route Number Carried: SR00020
 *7B Facility Carried: SR 20
 9 Location: 6.3 MI SE OF BALL GROUND
 2 GDOT District: 4841600000 - D6 District Six Cartersville
 *91 Inspection Frequency: 24 Date: 03/21/2016
 92A Fracture Critical Insp. Freq: 0 Date: 02/01/1901
 92B Underwater Insp Freq: 0 Date: 02/01/1901
 92C Other Spc. Insp Freq: 0 Date: 02/01/1901
 * 4 Place Code: 00000
 *5A Inventory Route(O/U): 1
 5B Route Type: 3 - State
 5C Service Designation: 1- Mainline
 5D Route Number: 00020
 5E Directional Suffix: 0. Not applicable
 *16 Latitude: 34 - 15.3888
 *17 Longitude: 84 - 19.7886
 98A Border Bridge: 0 98B: GA% 00
 99 ID Number: 0000000000000000
 *100 STRAHNET: 0- The Feature is not a STRAHNET route.
 12 Base Highway Network: Yes
 13A LRS Inventory Route: 571002000
 13B Sub Inventory Route: 0
 101 Parallel Structure: N. No parallel structure exists
 *102 Direction of Traffic: 2- Two Way
 *264 Road Inventory Mile Post: 21.11
 *208 Inspection Area: Area 09
 *104 Highway System: 1-Inventory Route is on the NHS
 *26 Functional Classification: 2- Rural - Principal Arterial - Other
 *204A Federal Route Type: F - Primary.
 *204B Federal Route Number: 00121
 105 Federal Lands Highway: 0. Not applicable
 *110 Truck Route: 0- The Feature is not part of the National Network for Trucks
 217 Benchmark Elevation: 0000.00
 * Location ID No: 057-00020D-020.85E

218 Datum:

0- Not Applicable
 *19 Bypass Length: 5
 *20 Toll: 3- On a Free Road or Non-Highway
 *21 Maintenance Responsibility: 01-State Highway Agency.
 *22 Owner: 01-State Highway Agency.
 *31 Design Load: 6- HS 20 + Mod (2-24,000# Axles @ 4ft Ctrs., when they govern)
 37 Historical Significance: 5- Not eligible for the National Register of Historic Places
 205 Congressional District: 011
 27 Year Constructed: 1986
 106 Year Reconstructed: 0
 33 Bridge Median: 0-None
 34 Skew: 20
 35 Structure Flared: No
 38 Navigation Control: 0- Navigation is not controlled by an Agency
 213 Special Steel Design: 0- Not applicable or other
 267A Type Paint Super Structure: 0- Not Applicable. Year : 0000
 267B Type Paint Sub Structure: Year : 0000
 *42A Type of Service On: 1-Highway
 *42B Type of Service Under: 5-Waterway
 214A Movable Bridge: 0
 214B Operator on Duty: 0
 203 Type Bridge: Q - Reinforced Concrete Bridge Culvert
 259 Pile Encasement: 3
 *43A Structure Type Main material: 1-Concrete
 *43B Structure Type Main Type: 19- Culvert
 45 Number of Main Spans: 4
 44 Structure Type Approach: A:0- Other B: 0- Other
 46 Number of Approach Spans: 0
 226 Bridge Curve: A: Vertical: NoB: Horizontal: No
 111 Pier Protection: N - Navigation Control item coded 0, or Feature not a waterway
 107 Deck Structure Type: N - None
 108A Wearing Surface Type: N. Not applicable
 108B Membrane Type: N. Not applicable
 108C Deck Protection: N. Not applicable
 265 Underwater Inspection Area: 0

Signs & Attachments

225 Expansion Joint Type: 00- No expansion joint.
 242 Deck Drains: 0- None.
 243A Parapet Location: 0- None present.
 243B Parapet Height: 0.00
 243C Parapet Width: 0.00
 238A Curb Height: 0.0
 238B Curb Material: 0- None.
 239A Handrail Left: 0- None.
 239B Handrail Right: 0- None.
 *240 Median Barrier Rail: 0- None.
 241A Bridge Median Height: 0
 241B Bridge Median Width: 0
 *230A Guardrail Location Direction Rear: 6- Both sides, approach and continuous.
 *230B Guardrail Location Direction Fwrd: 6- Both sides, approach and continuous.
 *230C Guardrail Location Opposing Rear: 0- None.
 *230D Guardrail Location Opposing Fwrd: 0- None.
 244 Approach Slab: 0- None.
 224 Retaining Wall: 0- None.
 233 Posted Speed Limit: 45
 236 Warning Sign: No
 234 Delineator: No
 235 Hazard Boards: No
 237A Gas: 00- Not Applicable
 237B Water: 00- Not Applicable
 237C Electric: 00- Not Applicable
 237D Telephone: 00- Not Applicable
 237E Sewer: 00- Not Applicable
 247A Lighting: Street: No
 247B Navigation: No
 247C Aerial: No
 *248 County Continuity No.: 00
 36A Bridge Railings: 1- Meets current standards
 36B Transition: 1- Meets current standards
 36C Approach Guardrail: 1- Meets current standards
 36D Approach Guardrail Ends: 1- Meets current standards

Bridge Inventory Data Listing Georgia Department of Transportation

Processed Date:3/9/2017

Bridge Serial Number: 057-0014-0

County: Cherokee

SUFF. RATING: 93.8

Programming Data

201 Project Number: BRF-12-1 (57)
 202 Plans Available: 1- Plans at General Office.
 249 Proposed Project Number: 000000000000000000000000
 250A Reconstruction Approval Status: No
 250B Route Approval Status: No
 250C Approval Status Definition: 0
 250D Approval Status Federal: 0
 251Project Identification Number: 0000000
 252 Contract Date: 02/01/1901
 260 Seismic Number: 00000
 75A Type Work Proposed: 0- Not Applicable
 75B Work Done by: 0- Initial Inventory
 94 Bridge Improvement Cost:(X\$1,000) \$180
 95 Roadway Improvement Cost: (X\$1,000) \$18
 96 Total Improvement Cost: (X\$1,000) \$270
 76 Improvement Length: 0.0'
 97 Year Improvement Cost Based On: 2013
 114 Future AADT: 24810
 115 Future AADT Year: 2031

Measurements:

*29 AADT: 16540
 *30 AADT Year: 2008
 109 % Truck Traffic: 1
 * 28A Lanes On: 2
 *28B Lanes Under: 0
 210A Tracks On: 00
 210B Tracks Under: 0
 * 48 Maximum Span Length: 11
 * 49 Structure Length: 46
 51 Bridge Roadway Width: 0.0'
 52 Deck Width: 0.0'
 * 47 Total Horizontal Clearance: 36.0'
 50A Curb / Sidewalk Width Left: 0.0
 50B Curb / Sidewalk Width Right: 0.0
 32 Approach Rdwy. Width: 24.0'
***229 Approach Roadway**
Rear Shoulder Left Width: 6 *Right Width:*6.0 *Type:* 8 - Grass (Dirt).
Fwd Shoulder Left Width: 6 *Right Width:*6.0 *Type:* 8 - Grass (Dirt).
Rear Pavement Width: 36.0 *Type:*2- Asphalt.
Forward Pavement Width: 24.0 *Type:*2- Asphalt.
Intersection Rear: 0 *Forward:*0

Ratings and Posting

65 Inventory Rating Method: 0-Field Eval and Documented Eng Judgement
 63 Operating Rating Method: 0-Field Eval and Documented Eng Judgement
 66A Inventory Type: 2 - HS loading.
 66B Inventory Rating: 36
 64A Operating Type: 2 - HS loading.
 64B Operating Rating: 61

231Calculated Loads

231A H-Modified: 00 No
231B Type3/Tandem: 00 No
231C Timber: 00 No
231D HS-Modified: 00 No
231E Type 3S2: 00 No
231F Piggyback: 00 No

261 H Inventory Rating: 20
 262 H Operating Rating: 34
 67 Structural Evaluation: 6
 58 Deck Condition: N - Not Applicable
 59 Superstructure Condition: N - Not Applicable
 * 227 Collision Damage:
 60A Substructure Condition: N - Not Applicable
 60B Scour Condition: 6 - Satisfactory Condition

Hydraulic Data

113 Scour Critical: 8. Foundation stable for conditions; scour above footing
 216A Water Depth: 1.6
 216B Bridge Height: 08.7
 222 Slope Protection: 0
 221A Spur Dike Rear:
 221B Spur Dike Fwd:
 219 Fender System: 0- None.
 220 Dolphin:
 223A Culvert Cover: 4
 223B Culvert Type: 1- Concrete.
 223C Number of Barrels: 4
 223D Barrel Width: 10.0
 223E Barrel Height: 9.0
 223F Culvert Length: 76.0
 223G Culvert Apron: 1
 39 Navigation Vertical Clearance: 0'
 40 Navigation Horizontal Clearance: 0
 116 Navigation Vertical Clear Closed: 0

53 Minimum Vertical Clearance Over Rd: 99' 99"
 54A Under Reference Feature: N- Feature not a highway or railroad.
 54B Minimum Clearance Under: 0' 0"
***228 Minimum Vertical Clearance**
228A Actual Odometer Direction: 99'99"
228B Actual Opposing Direction: 99'99"
228C Posted Odometer Direction: 00'00"
228D Posted Opposing Direction: 00'00"
 55A Lateral Underclearance Reference: N- Feature not a highway or railroad.
 55B Lateral Underclearance on Right: 0.0
 56 Lateral Underclearance on Left: 0.0
 10A Direction of Travel for Max Min: 0
 10B Max Min Vertical Clearance: 99'99"
 245A Deck Thickness Main: 0.0
 245B Deck Thickness Approach: 0.0
 246 Overlay Thickness: 0

60C Underwater Condition: N - Not Applicable
 71 Waterway Adequacy: 9-Superior to present desirable criteria.
 61 Channel Protection Cond.: 8-Equal to present desirable criteria.
 68 Deck Geometry: N
 69 UnderClr. Horz/Vert: N
 72 Approach Alignment: 8-No reduction of vehicle operating speed required.
 62 Culvert: 6 - Satisfactory Condition
 70 Bridge Posting Required: 5. Equal to or above legal loads
 41 Struct Open, Posted, CL: A. Open, no restriction
 * 103 Temporary Structure: No

232 Posted Loads

232A H-Modified: 00
232B Type3/Tandem: 00
232C Timber: 00
232D HS-Modified: 00
232E Type 3s2: 00
232F Piggyback: 00
 253 Notification Date: 02/01/1901
 258 Federal Notify Date: 02/01/1901

Attachment 8

Minutes of Concept Meeting



SR 20 Improvements from Canton to Cumming

PI No's: 0014131, 0014132, 0014133, 0002862, 0003682

AECOM
1360 Peachtree Street NE,
One Midtown Plaza, Suite 500
Atlanta, GA 30309
www.aecom.com

404 965 9600 tel
404 965 9605 fax

AECOM Proj.: 60507210 (File 60267130)

Meeting Agenda

Subject: Concept Team Meeting for SR 20 Corridor Improvements (Canton to Cumming)

Date: March 10, 2017

Location: GDOT – Rm 409

Attendees:

Cynthia Burney – GDOT
Nicole Law – GDOT Outgoing PM
Cleopatra James – GDOT Incoming PM
Scott Gero – AECOM PM
Laura Dawood – AECOM Environmental
Lindsey Dunnahoo – AECOM Engineer
Paola Rojas – AECOM Engineering
Chad Bishop – AECOM Engineer
Chandria Brown – GDOT
R Lawrence – GDOT Planning
Angela Turner – GDOT Design Policy
Aaron Burgess – GDOT NEPA
Chris Raymond – GDOT TMC
Jim Pomfret – GDOT OES
Walt Taylor – GDOT Engineering Services
Erik Rohde – GDOT Engineering Services
Chuck Hasty – GDOT Engineering Services
Chesleion Charles – Southern Company Gas

District 1:

Tina Apperson – GDOT
Lynn Palmer – GDOT Utilities
Kevin York – GDOT R/W
Harold D. Mull – GDOT DCE
Pete Hughes – SEMC
Ted Brown – SEMC
Mike Souther - Windstream

District 6:

Barry Hensley – Assistant Construction Manager
Bethany Watson – Assistant City Engineer (Canton)
David Hatabian – City Engineer (Canton)
Geoff Morton – Cherokee County
Jennifer Deems – GDOT Utilities
Duane Fant – District 6 R/W
Dee Carson – District 6 Traffic Ops
David Acree – District 6 Pre-Construction
Keith Day – District 6 Area Mngr
Brian Whelchel – District 6 Asst Area Mngr
Grant Waldrop – GDOT Traffic Ops
John Gay – Engineer (Georgia Power)
Drace Farrell – Engineer (Windstream)

-
- Introduction of SR 20
 - Map – See Attachment 1
 - History
 - Screen 2 Alternatives => Widen Existing – See Attachment 2.
 - Accelerated Schedule
 - Streamlined PFPR in April
 - Right of Way in June
 - Standard PFPR in late fall/early winter
 - Modified PDP
 - Concept Report
 - Proj Justification
 - Need & Purpose
 - Traffic / Lane Call
 - See Attachment 3 for laneage demand determination
 - Goal: LOS D for entire corridor
 - Functional Classification – See attachment, Urban/Rural Arterial.
 - Typical Section:
 - Urban vs. Rural – Urban typical to minimize impacts, to stay consistent with the development patterns in the area, and help with MS4 design.
 - Drainage/MS4 – project approach – Approach is to catch, treat, and detain all water that falls on the road. Offsite runoff will be conveyed in a separate system from the onsite runoff.
 - 11' & 12' lanes
 - Per VE study recommendation, the typical section is being revised to 11' inside lanes and a 12' outside lane.
 - Harold recommended one 11' inside lane, with a 12' middle and outside lane for truck accommodations.
 - Sidewalk and multi-purpose paths – Cherokee County has a planned trail from Cherokee Veterans Park to Smithwick Creek. Forsyth County has a planned trail from Spot Rd to Sawnee Mountain as well as on the east side of Post Rd.
 - Pavement Design – Rigid vs. Flexible – PES & PTS requested in August, 2016.
 - Design Speed: 45 vs 55 mph => Escalation Memo or Concept Report
 - AECOM will put together an escalation memo for 45 mph
 - Cynthia went to the public meeting hosted by Senator Brandon Beach. A question was raised about the speed limit on the road and the public seemed OK with 45 mph.
 - Draft VE Study Recommendations – See Attachment 4 for draft responses to the draft recommendations. The team is waiting for the final VE Study Report.
 - Utilities – SUE
 - How can we accelerate utility conflict resolution (relocation determination) to achieve comfort with R/W needs by June?
 - Dictate where utilities can go on a typical section
 - Hold workshops for utility coordination with each district and invite utility owners
 - R/W: (120' – 250'+)

- Encompass all needs as R/W or only to Shoulder Breaks and easement beyond? Both District 1 and District 6 prefer to have right of way everywhere to make it easier for utility relocations. Right of way should be evaluated on a case by case basis (i.e. use easements to save a parking lot).
 - Kevin York will be coordinating right of way for the entire corridor
- Access Control/Innovative intersections:
 - R-Cuts
 - Median U-turns (Michigan Lefts) – SR 371/Post Rd, Bethelview Rd
- Context Sensitive => NEPA => Avoid, Minimize & Mitigate
 - Meeting with USACE 3/16 to review alignment (USACE is lead federal agency due to need for permit to impact Waters of the US)
- ROLL PLOTS of Concept Layout
 - School Drwy Access at Freehome Elementary
 - Geoff will coordinate with Freehome Elementary about access - AECOM to send PDF.
 - Drwy at McDonald's
 - All agreed with closing the Dec 2016 PIOH proposed right in/right out driveway at McDonalds. There is not enough room to add a deceleration lane without significant displacement of parking spots adjacent to the road. Three access points will still be viable from E Cherokee Drive as well as from two location from SR 20 (at light to Kroger and one right in/right out drwy at east end of strip plaza. There is interparcel access currently available and it will remain with the proposed improvements.
- Environmental Permitting:
 - USACE (Lead Agency) – PAR - Submitted 3/1
 - Public Involvement – Next PIOH after Streamlined PFPR and before R/W (May). The intent is to show the actual propose R/W and easements to allow for one final look and comment to tweak before finalizing R/W Plans.
- Construction: (Constructability to be combined w Streamlined PFPR)
 - The majority of the project should be pretty straightforward to construct as we are widening a 2-lane to a 6-lane divided. This large widening will create plenty of space and opportunity to maintain traffic on one side while constructing the other side. There are not many changes proposed to the mainline profile which further simplifies staging.
 - Show cross sections with retaining walls and staging cross sections at critical stations.
 - Detours will not be needed for mainline construction. Some side roads may need detours (TBD) running traffic on temporary gravel surfaces.
- Other
 - Concern that the signals at East Cherokee and Kroger are too close. Per district traffic, the signals are close enough to be co-ordinated and are not an issue. These are existing signal locations.
 - Evaluate the pond in the southwest corner of the Union Hill intersection to see if it can be moved closer to SR 20 (there is a planned development in this parcel)
 - Add the multi-use trails to the typical sections in the Concept Reports

- OK to cut off Franklin Goldmine from SR 20 (cul-de-sac near SR 20)
- Angela asked about the intersections that are shown to fail in the design year. AECOM to determine what year these intersections will fail.
- Pipe Clearance – Need a variance to reduce clearance requirements
 - Up-class the pipe
 - Steel en-case the pipe
 - Switch to an elliptical pipe
- Add TIP #FT-313 to concept report for 0003682

MEETING SIGN-IN SHEET

Project: SR 20

Meeting Date:

March 10, 2017

Facilitator: Nicole Law/Scott Gero

Place/Room:

OGC 409

Name	Company	Phone	E-Mail
Laura Dawood	AECOM	770.548.9904	Laura.dawood@aecom.com
Chad Bishop	AECOM	404-965-7050	chad.bishop@aecom.com
Cynthia Burney	GDOT	4-631-1851	cburney@dot.ga.gov
Nicole Law	GDOT	4-631-1721	nlaw@dot.ga.gov
Cleopatra James	GDOT	4-631-1546	cjames@dot.ga.gov
CHESLETON CHARLES	SOUTHERN COMPANY GAS	4.584.3257	ccharles@southernco.com
Chandria Brown	GDOT	4)631-1580	chbrown@dot.ga.gov
Roshni LAWRENCE	GDOT-PLANNING	404 631 1774	Roshni.lawrence@dot.ga.gov
Angela Turner	GDOT Design Policy	404)631-1736	anturner@dot.ga.gov
Scott Gero	AECOM	404) 965-9726	scott.gero@aecom.com

Project: SR 20**Meeting Date:**

March 10, 2017

Facilitator: Nicole Law/Scott Gero

Place/Room:

OGC 409

[illegible]

Co	Name	eMail	Phone
SEMC	Pete Hughes	Pete.hughes@samnee.com	678-455-1393
SEMC	TED BROWN	TED.BROWN@SAWNEE.com	678-455-1552
GDOT	Tina Apperson		
GDOT-Util.	Lynn Palmer	jlpalmer@dot.ga.gov	770-531-5752
GDOT-R/W	Kevin York	Keyork@dotagov.gov	770-531-5384
GDOT-DCE	NAROLD D. MULL	nmulle@dot.ga.gov	770-531-5769
WINDSTREAM	MIKE SOUTHER	MIKE.SOUTHER@WINDSTREAM.COM	404-831-0415

Concept Team Meeting- Cherokee Co 0003681

3/10/2017 Sign In

[illegible]

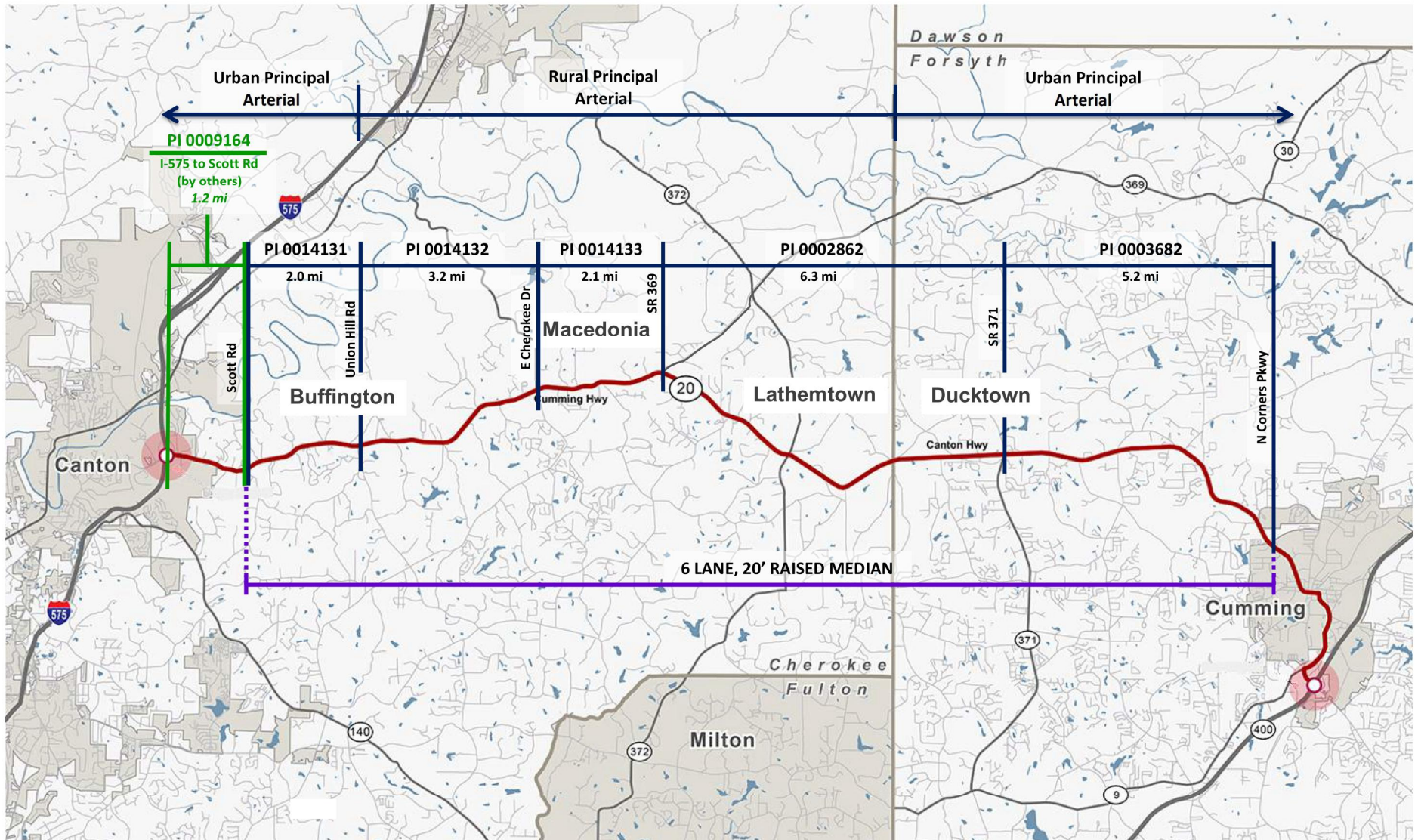
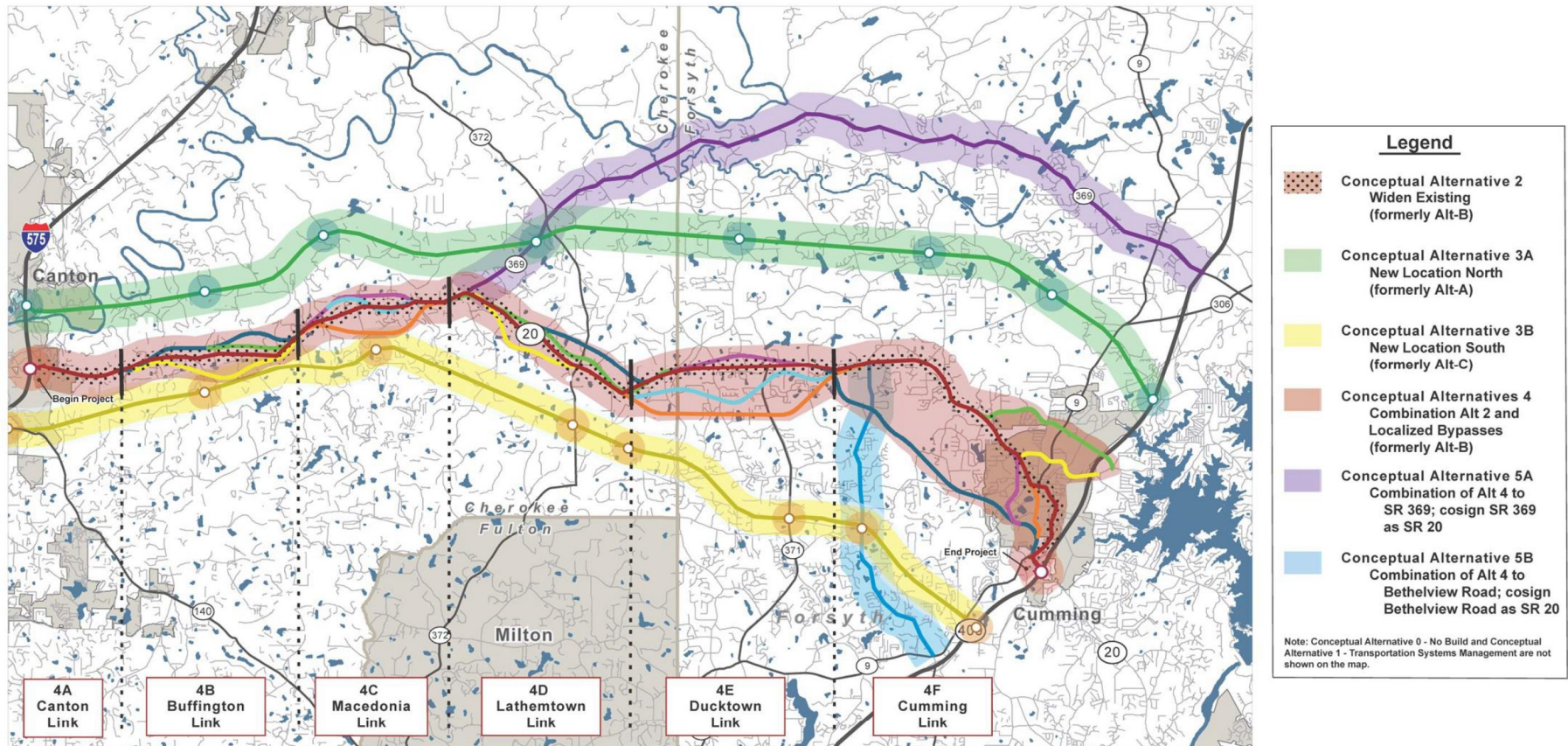


Figure 1.3 Conceptual Alternatives



2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------

Peak Hour Directional, Transitioning Areas, State Signalized Arterials, Class I (40 mph or higher posted speed limits), LOS D Criteria									
1460	4 Lanes Needed	Growth Rates:		I-575 to SR 369		SR 369 to SR 371		SR 371 to Cumming	
3200	6 Lanes Needed	3.4%	2014-2025 Growth Rate (I-575 to SR 369)	3.6%	2014-2025 Growth Rate (SR 369 to SR 371)	3.6%	2014-2025 Growth Rate (SR 371 to SR 400)		
4820	8 Lanes Needed	2.9%	2025-2045 Growth Rate (I-575 to SR 369)	3.0%	2025-2045 Growth Rate (SR 369 to SR 371)	3.2%	2025-2045 Growth Rate (SR 371 to SR 400)		

Meeting Minutes

Subject: Discussion with OPD on preliminary VE Study Recommendations

Date: March 3, 2017, 9:30 am

Location: GDOT 25th floor, OPC Conf Rm

Invitees: GDOT: Nicole Law (PM), Albert Shelby (State Program Delivery Administrator)
Project Team: Scott Gero (PM), Lindsey Dunahoo (Lead Eng), Paola Rojas (Eng)

Review of the Draft VE Study Recommendations - The VE Study was completed this week. Today's meeting is for the project team to go over the preliminary recommendations with the Office of Program Delivery to determine draft responses and direction forward on the various recommendations.

1.0 – Reduce from 6 to 4 lanes from Union Hill Rd to SR 371 (PI #'s 0014132, 0014133, 0002862) – No, we do not agree with implementing this recommendation. GDOT upper management has determined that the design will proceed with 6 lanes.

2.0 – Reduce lane widths from 12-feet-wide to 11-feet-wide – We agree that reducing the design to 11 foot lanes will reduce impacts to adjacent resources and will still provide an adequate facility for vehicular flow however, we only agree to a portion of this recommendation. See the next issue and response.

2.1 – Reduce inner 2 lane widths each direction from 12-feet-wide to 11-feet-wide (outside lane width each direction remains 12 ft). We agree to implement this recommendation. We feel that the outside lane should provide the full 12 ft lane width to accommodate tractor trailers on this truck route. The reduction in lane width of the two inner travel lanes will help reduce:

- The footprint and impacts to the adjacent parcels and resources
- The amount of runoff that needs to be treated and detained to meet MS4 and Drainage Design Policies.
- The distance pedestrians have to cross at intersections and therefore reducing the phases necessary for this movement.
- The cost through savings in materials needed for construction and maintenance of the roadway.

3.0 – Reduce median width from 20 ft to 16 ft – No, we do not agree with implementing this recommendation. The project proposes to provide a 6-lane section (3-lanes in each direction). GDOT Policy states that full median breaks are not allowed at side roads or access points unless there is a signal warranted and installed. Due to the 6-lane section, Restricted Crossing U-Turns (R-Cuts) will be installed to manage access and limit to one-way operation through the median. The design of the R-Cuts require that positive median separation (a raised median) be provided to manage traffic and discourage wrong way use of the opening. Although the VE Study team has developed a sketch of a way to provide a reduced section in the 16 ft median which consists of an 11 ft turn lane and back to back curb and gutter to provide a positive median separation, studies of other projects using similar raised median width reductions have found negative consequences with this reduced design width. Negative issues identified include:

- Reduced visibility of narrow raised median incurring impacts due to vehicles not observing and therefore not yielding to their intended prevention of crossing.
- Reduced width not an obviously large enough median width to deter those who recognize the obstruction but not finding it intimidating enough to prevent their crossing it anyways.

In addition, the project team prefers the full 20 ft median to provide enough green space to provide some landscaping to soften the affect of the ultimate facility of 6-lanes of traffic. There has been some public

objection to the 6 lanes vs 4 lanes section and the large expanse of pavement proposed. The 20 ft median will provide a larger green space in the middle to break up the expanse of asphalt and hopefully be more aesthetically pleasing and sensitive to the communities in which this project resides.

The project team therefore disagrees with the recommendation and prefers to continue with the 20 ft raised median to better manage traffic flow, provide a safer more visible channelizing barrier, and to provide a more aesthetically pleasing final product.

4.0 – Construct rural shoulder with 10-foot-wide overall shoulder with 4-foot-wide partial depth pavement. No, we do not agree with implementing this recommendation. The project resides within an MS4 region and therefore is subject to post construction stormwater management as well as the requirements of the Drainage Design Policy Manual with a post-developed flow increase. Post construction stormwater management requirements include stormwater runoff quality/reduction, stream channel protection, and overbank flood protection. In order to satisfy these requirements we intend to capture all of the runoff of the pavement through use of curb and gutter (an urban shoulder) into a separate closed drainage system which will pipe the roadway runoff to a permanent post construction stormwater detention basin. This permanent BMP will provide water treatment and detention before releasing downstream to a water of the US. Additionally the point outfalls will be limited therefore reducing the number of required BMPs. Utilizing a rural shoulder may allow sheet flow for treatment of water quality but this technique would not provide the necessary detention requirements to satisfy the post construction flow increases.

4.1 - Construct 12-foot-wide urban shoulder in lieu of 16-foot-wide urban shoulder. The project team agrees to partially apply this recommendation. In areas where a 16 ft shoulder can fit without significant impact to adjacent resources, we recommend keeping the 16 ft shoulder. This provides additional buffer between pedestrians on the sidewalk and the through traffic. This also provides more area for utility relocations to fit combined with other roadside elements. In areas where a reduction to a 12 ft shoulder width would avoid or minimize adverse impacts to adjacent resources, this reduced width shoulder would be employed.

7.0 – Eliminate ponds at five displacements The project team is evaluating the requirements of MS4 and the management of runoff to conform with the MS4 Permit as well as the drainage manual. The team is evaluating the design of BMP's to address both with every intent to minimize impacts and displacements. The project team feels this recommendation is shortsighted in that it only addresses consideration of MS4. The Drainage Design for Highways manual section 10.2.1.1 requires that the added runoff from a project that adds impervious surfaces does not adversely affect downstream for the 25 year storm. This additional requirement of the design team essentially encompasses or trumps the MS4 BMP infeasibility requirements. MS4 allows a method of evaluation and consideration whereby cost and/or impacts can render a need to meet MS4 requirements infeasible thereby eliminating this BMP. However, we are still obligated by the drainage manual to address the detention of additional runoff and therefore are still obligated to provide measures to satisfy this detention. For this project, the detention is being addressed with detention ponds and therefore they cannot be eliminated even to avoid a displacement although a avoiding displacements is the first choice in locating a pond.

10.0 – Perform detailed MS4 calculations to allow for elimination of ponds; acquire non-pond parcels first This project has an extremely accelerated schedule with R/W Authorization scheduled for FY 17 for this 18.8 mile long project. The magnitude of the effort required to perform detailed MS4 calculations to allow for elimination of ponds is not feasible to meet this accelerated schedule. The project team philosophy and approach to simplify and streamline the design process to establish conservative construction limits and subsequent Required R/W and Easements is as follows:

- Capture all runoff on SR 20 utilizing curb and gutter and a separate drainage system to pipe runoff from the roadway to detention ponds.
- Dry Detention Ponds are one of the possible MS4 BMP's for treating the water quality of the runoff as well as for detaining the water quantity of runoff. This dry pond BMP can treat 65% of

the TSS in the runoff. The MS4 permit requires that 80% of the TSS be removed from the runoff of newly added pavement. The weighted average of 65% of treatment by the pond of all the pavement runoff will for the majority of the drainage areas be equivalent to or exceed the 80% requirement of treatment of the additional pavement. The dry detention pond will in the majority of the drainage areas satisfy the water quality requirement of the MS4 permit and therefore eliminate lengthy and detailed analysis of multiple BMP alternatives or BMP trains. This in turn will save design time and get us to R/W Authorization sooner.

- The dry detention ponds will be initially sized to detain the volume of water from the 25 year storm event. When combined with the ability to achieve the TSS removal objective, these ponds will now satisfy both water quality and water quantity objectives as well as prevent downstream flooding to satisfy the downstream hydrologic assessment required by the drainage manual.
- This initial pond sizing will establish the conservative Required R/W and Easements to construct the pond including access roads for future maintenance. Now the team can prepare the Right of Way Plans to acquire the conservative project limits.
- Once the ponds have been sized, the drainage engineers will further detail evaluate whether the pond sizes can be reduced by:
 - Analyzing to see if allowing the new runoff to bypass the need for detention to pass the downstream hydrologic assessment without creating a downstream flooding situation. If so, the pond can then be secondarily analyzed and considered for whether or not it can be determined infeasible by means in accordance with the MS4 design process or if it can be replaced by other BMPs that would have smaller footprints and therefore require less R/W.
 - Analyzing the pre-development runoff flows and designing this flow rate into the detention pond outflow control structure along with the flow and outfall design necessary to successfully treat the removal of TSS (water quality) and then reducing this continuous flow across the design year storm duration from the overall pond size. This essentially optimizes the pond size down from its original conservative pond size developed in the earlier steps.

The design team agrees that the R/W acquisition team should begin acquiring parcels without the detention ponds or BMP's first allowing more time for the design team to conclude if detention ponds can be eliminated or reduced in size and then revise the Right of Way Plans with the savings prior to approaching the property owner for acquisition.

12.0 – Use consistent Right-of-Way width with permanent easements beyond. No, we do not agree with implementing this recommendation until further discussion and research can be completed. The project team plans to discuss with the District R/W Agents whether or not it makes sense to purchase all needed property as R/W or whether minimizing R/W and utilizing easements for construction of slopes would be appropriate for this corridor. Often times in rural areas, property owners have no desire to hang onto lands with an easement for a roadway slope when they can't find it to be useable for anything. In these cases they would prefer all needs to be required R/W and tie in slopes to be steeper. Typically in urban environments, placing the Required R/W at the should break minimizes impacts to adjacent parcels as these property owners would rather keep the slopes tying to existing as flatter slopes and useful as yards or other useful aspects of their property even though they may be permanent or even temporary easements. The project team will reach out to the District 1 and District 6 R/W agents for guidance and adjust accordingly.

17.0 – Use Design/Build as project delivery method to meet expedited schedule. No, we do not agree with implementing this recommendation. We have not seen conclusive evidence that the Design/Build project delivery method provides costs savings over traditional design bid build. We recognize that time savings could be realized through this method but not necessarily, cost savings.

Schedule – Albert said to add into our schedule time to present the design and R/W needs following the PFPR and before presenting to the public at the next round of PIOH's.

PIOH Displays – Albert agreed that proposed signals should be shown on PIOH displays even if they have not been approved as TE Studies through the District Traffic Engineers. All recognized that failing to show likely signals is confusing to the public and just creates further angst. Albert said to make sure to add a label such as "Pending approval of a TE Study" or similar.

45 mph vs 55 mph: Scott recommended that the project be designed to 45 mph to prevent the additional need for a paved 10 ft outside shoulder and 2' paved inside shoulder for speeds over 45 mph. This will save on footprint, an obvious concern by the public who is pushing back on the need for 6 lanes. It will also save on runoff for detention pond sizing and cleaning of pollutants. It will also save on overall construction and R/W costs by minimizing the footprint size. Albert said the best way to handle this would be to write an escalation memo for the Chief Engineer to request design to 55 mph with a variance from the need for the additional shoulder offset widths to the raised medians. Scott explained that currently all of SR 20 in Cherokee County and the first part into Forsyth County is currently posted as 45 mph. It then increases to 55 mph and drops back down to 50 mph just east of Sr 371/Post Rd to the end at N Corners Pkwy. Albert said to include a graphic depicting this in the escalation memo as it will help with the issue.

Attachment 9

Meeting Minutes (Other)

SR 20 Improvements from Canton to Cumming

Project No's: STP00-0002-00(862),
STP00-0003-00(681), STP00-0003-00(682)
PI No's: 0002862, 0003681, 0003682

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AECOM Proj.: 60267130

Meeting Minutes

Subject: Initial Concept Team Meetings for the SR 20 Corridor Improvements

Date: 2:00 pm March 5, 2013 at the GDOT District 1 Office (Gainesville)
10:00 am March 6, 2013 at the GDOT District 6 Office (Cartersville)

Attendees: see attached sign-in sheets

The meeting began with a round of introductions for everyone in attendance.

Karyn Matthews, GDOT PM, welcomed everyone and asked that they all participate and provide input as the project is presented throughout the meeting. She then introduced Scott Gero as the consultant Project Manager.

Scott Gero, Karyn Matthews, Claudia Bilotto (NEPA Lead), Don Gaines (traffic engineer), Leah Vaughan (Public Involvement lead), and Matt Scofield (Public Relations lead) went through a power point presentation that presented the project. See attached. The power point presentation touched on the following topics:

- Project location – SR 20 from I-575 to SR 400 in Cherokee and Forsyth counties
- History of projects – formerly 3 independent EA's => reissued as one EIS
- Schedule – 6 years to get to a ROD plus 2-3 more to get to letting.
- Project framework and approach
- Approach to public involvement
- Outreach to date –
 - Listening Tour – mtgs with city/county engineers and leaders, chambers of commerce, newspapers (Cherokee Tribune, Forsyth County News) – went over key takeaways from these meetings
 - Water Tank Rd Neighborhood Watch meeting – met with homeowners at their request to describe the project and process
- Metro Quest – the beta version of this new to GDOT software and website was presented for SR 20. It provides another tool for reaching out and gathering input. The screens include:
 - Welcome screen – general location and description of project and process
 - Priorities screen – allows user to prioritize their top 5 issues for the corridor
 - Show Us screen – interactive map that allows user to drop icons on map and enhance the icon's with information (ex. Work Icon – drop on location and enhance with travel mode and frequency)
 - Survey screen – further asks questions to understand the perspective of the user
 - Stay Involved screen – opportunity to provide additional demographic information including contact info, as well as provides links to project website, GDOT, & FHWA.
- Key messages for all when interacting with any agencies or public
- Project Justification Statement
- Draft Need and Purpose (final to be developed during the "Scoping" phase)
- Functional Classification – mix of Urban and Rural Principal Arterials
- Maps showing LOS 2010 and 2040

- **Action** – verify that the 2040 LOS no-build projections takes into account the passing lane project currently under construction in Cherokee County.
- High crash areas map – crash data collected from CARE for 2007-2009 (the most recent available data), considers 5 or more crashes per year to be a high crash location
- Planned and programmed projects on a map showing:
 - Programmed
 - Long Range
 - Aspirations
- Explanation of the “Scoping” process as required by an EIS
- Initial thoughts on design considerations
- Request of known maintenance issues – none provided
- Utilities – SUE will be used on the project. There was a call for any special utility issues.
 - GA Transmission (March 6 mtg) mentioned they have a proposed crossing. Locations were provided through Karyn Matthews by email on 2/7/13. There is an existing GTC line in Canton that is perpendicular to the corridor and there are some nearby facilities in Cumming though it is believed that they have been moved as a result of other projects. It should be fairly clean – they will double check.
 - AT&T mentioned that they have some facilities and would provide to our SUE (TBE Group). This includes 12 pair duct banks along SR 20, closer to Cumming, and includes locations under existing pavement.

Scott stressed that this project is currently seeking ways to “improve” SR 20. The scoping process will bare out whether or not the project becomes a widening project. At this point in the EIS and project development, the key message is that we are seeking ways to improve SR 20 so that we can safely and efficiently move people and goods through the corridor.

Notes from the District 1 meeting:

Teri Pope asked if the SR 20 project currently under construction were included on the project website. The team responded that all of the SR 20 projects have been consolidated onto one main page at www.dot.ga.gov/sr20improvements. From that page, you can follow a link to specific project information.

The City of Cumming commented “The sooner the better”.

A representative mentioned that GTC was purchasing Right of Way now along the entire corridor for a new line between Canton and Cumming.

Neil Cantner asked if there are any specific areas where issues were worse than another. The team responded that each end of the corridor – the Canton and Cumming areas within the city limits and tie ins to GA 400 and I-575 – were anticipated to be the most complex.

Someone asked the duration of the project (8-10 years) and how many projects were included (three). Another attendee asked if staging would be discussed in this phase of the project. Scott responded that it would occur later as the alternatives are developed and most likely at the Concept Team Meeting.

Notes from the District 6 meeting:

Mike Haithcock (Dist 6 Asst Dist Engineer) commented that they have received some funding for some quick turnaround projects that were less than \$200K. The district has identified 7 or 8 projects to date that were located within right of way limits and did not involve utility relocations. Examples of these projects include right or left turn lanes or signals. He asked that as the project team evaluates the corridor, that if they see any potential small projects that would provide immediate benefit and fit the criteria, that they bring these to the attention of District 6. District 6 would then further evaluate to see if the projects fit into their funding and improvement plan. This should take place over the next 6 months.

Keith Posey (?) asked how the website will be publicized? The team responded that the GDOT project website address would be included on all project materials including flyers, webcards, press releases, and signage and would also be promoted through social media outlets including Facebook and Twitter. The MetroQuest website will be directly linked to the GDOT project website.

Mike Haithcock commented that distrust in Government is a general problem in the districts. He has found that making an effort to send GDOT staff to standing meetings in response to requests goes a long way. He offered the district's assistance in doing this throughout the course of the project.

Mike Haithcock commented that if there are solutions or projects that will potentially look at access control, the district could go in and buy access rights in advance.

Other notes:

Need to add proposed park at Water Tank Road to the Concept Layout.

Cynthia Burney provided information regarding Safety Projects along SR 20 and SR 140 – limits for the project are the western and eastern Cherokee County boundaries. These improvements include surface treatments, guardrail, and additional signage in some locations – all low cost improvements. The project is anticipated to let in December.

Meeting Minutes

AECOM Proj.: 60507210 (File 60267130)

Subject: Design issues**Date:** September 21, 2016, 10:00 am**Location:** GDOT OPC Conf Rm (25th floor)

Attendees:	Hiral Patel	GDOT Director of Engineering
	Brent Story	GDOT Design Policy & Support
	Dan Pass	GDOT Design Policy & Support
	Albert Shelby	GDOT Program Delivery Engineer
	Nicole Law	GDOT PM
	Scott Gero	AECOM PM
	Lindsey Dunnahoo	AECOM Engineer
	Jeff Wood	AECOM Traffic Engineer
	Laura Dawood	AECOM Environment Lead

- **Proposed Laneage & Cost –**

- Traffic data analyzed and projected out to Design Year 2045 to determine laneage needs (See attachment)
- AECOM recommended 6 through lanes from Scott Rd to SR 369 and then from SR 371 to N. Corners Pkwy (project end on the west side of Cumming). A 4-lane section is recommended in the middle from SR 369 to SR 371.
- The 6-lane (w 4-lane for PI 0002862) has a concept cost of \$315 MM. The 4-lane has a concept cost of \$270 MM. GDOT acknowledged that the relatively minor difference in cost was worth pursuing the 6-lane option since it meets the design year demand.
- The concept should include carrying 6-lanes the entire way so that it won't need to be revisited for future expansion later. This will be the preferred approach for now and what we should take to the public for comment. If there are concerns raised through the public involvement effort, then those areas would be reconsidered at that time.
(Following the meeting it was determined that this approach will be presented to the Chief Engineer through an escalation memo to confirm.)

- **Access Control –**

- GDOT directed AECOM to design for Permitted Access and allow the District to determine which driveway access will be approved in the future. It would be too difficult for this corridor with the many existing driveways and access points to try to switch it to Partial Control of Access at this time. AECOM should try to combine driveways and pull back driveways from the functional area of intersections where feasible.
- The topography drops off to both the north and south sides in many locations which limits the adjacent network of roads. Many of the side roads, especially to the north of SR 20 tie directly to SR 20 and do not have a connecting parallel route. Therefore, many of the side roads need to have continued access to SR 20 as there are no other alternatives.

- **Other Design Issues:**

- The design speed should match the existing posted speeds. Alternative speed designs can be considered later in the design process if needed.
- Signals are determined based on warrant analysis
- AECOM proposed utilizing RCUT intersection control in lieu of additional signals to manage access. The context of the adjacent access will determine if the RCUT will be designed to accommodate passenger cars (can occur within the 6-lane and median footprint) or if it needs to accommodate tractor trailers (additional eyebrow paving needed for turning movement of large vehicles). RCUT median breaks to accommodate tractor trailers would be spaced at a logical distance and signed so that truck drivers would know not to try to U-turn in a passenger car only median break. GDOT agreed that this is a good approach to this corridor. It will improve safety and reduce friction points for the through movement providing better throughput and reduced travel times.
- The roundabouts would need to be peer reviewed. GDOT has considered 2 lane roundabouts, but 3 lanes is out of the norm to date. Consider 3 approach lanes tapering to 2 lane roundabout.
- Since this is state funded, consider assessing non-AASHTO standard situations and evaluating needs to improve sub-standard existing conditions on a case by case basis, and use data (e.g., crash) to support decision-making. For example, improving sags has not been a requirement even for FHWA projects.
- Other techniques for access control should be applied where feasible:
 - Consolidation of side roads and driveways
 - Elimination of dual driveways for parcels that can function with one, recommend design in this way and if there are concerns during RW acquisition, then design can be revisited on a case by case basis.
 - Acquisition of access rights from adjacent properties where feasible
- Median widths:
 - 20' raised (45 mph)
 - 24' raised (>45 mph) – provides a 2' buffer from the Type 7 curb of the raised median
 - 32' depressed (55 mph 4-lane) – decided not to use but rather to move forward with a 6-lane and 20' or 24' raised median
 - 44' depressed – if a 6-lane will not work in portions of PI 0002862 due to excessive impacts, then it may be best to provide a 4-lane with a 44' depressed median for portions that can accommodate this width and which can be expanded to a 6-lane in the future. The constrained areas would be a 4-lane with a reduced raised median and in the future if 6-lanes are needed, these areas of high impacts would have to be re-evaluated and addressed at that time. This scenario would only be considered if it is found that a 6-lane section would have unacceptable impacts if constructed now.
 - Median widths can be reduced in certain areas if we get pushback from the public.
- Shoulders:

- Brent instructed AECOM that it is acceptable to utilize a rural shoulder on one side of the road opposite of an urban shoulder if it fits into the context of the area. AECOM agreed and recommended a rural shoulder where possible to assist with water quality and MS4 design. It is more difficult to meet MS4 with a curb and gutter/closed drainage design than with rural shoulders. Brent Story agreed.
- Shoulder widths can be reduced in certain areas if we get pushback from the public.
- Public Involvement:
 - Based on the decisions today, AECOM will revise the layout and can then schedule meetings with local elected officials.
 - The project team should inform the District Engineers (Comer (Dist 6), Cook (Dist 1)) of any meetings and extend the offer for their attendance if available.
 - Elected state representatives can be informed through a letter and referral to displays on the website. This should be done in advance of the PIOH meeting dates.
 - Once the design is revised, a set of PIOHs (2 nights, 1 on east end and 1 on west end) can be scheduled and conducted. Anticipate not needing as much educational materials as at previous PIOHs. The displays should include:
 - Renderings/simulations (e.g., where the new road paints over the existing roadway and takes the viewer on a drive of the corridor)
 - Roll plots
 - Educational materials for RCUTs (Tyler Peak at D3 may have some good resources.)
 - The project team should anticipate that public input may affect the concept layout.
- Environment
 - Prior to going to PFPR, there needs to be a comfort level that resources have been identified and effects determinations are not going to change (e.g. from adverse to significantly adverse under GEPA).
 - Do not necessarily need an approved GEPA document

Displays/Handouts:

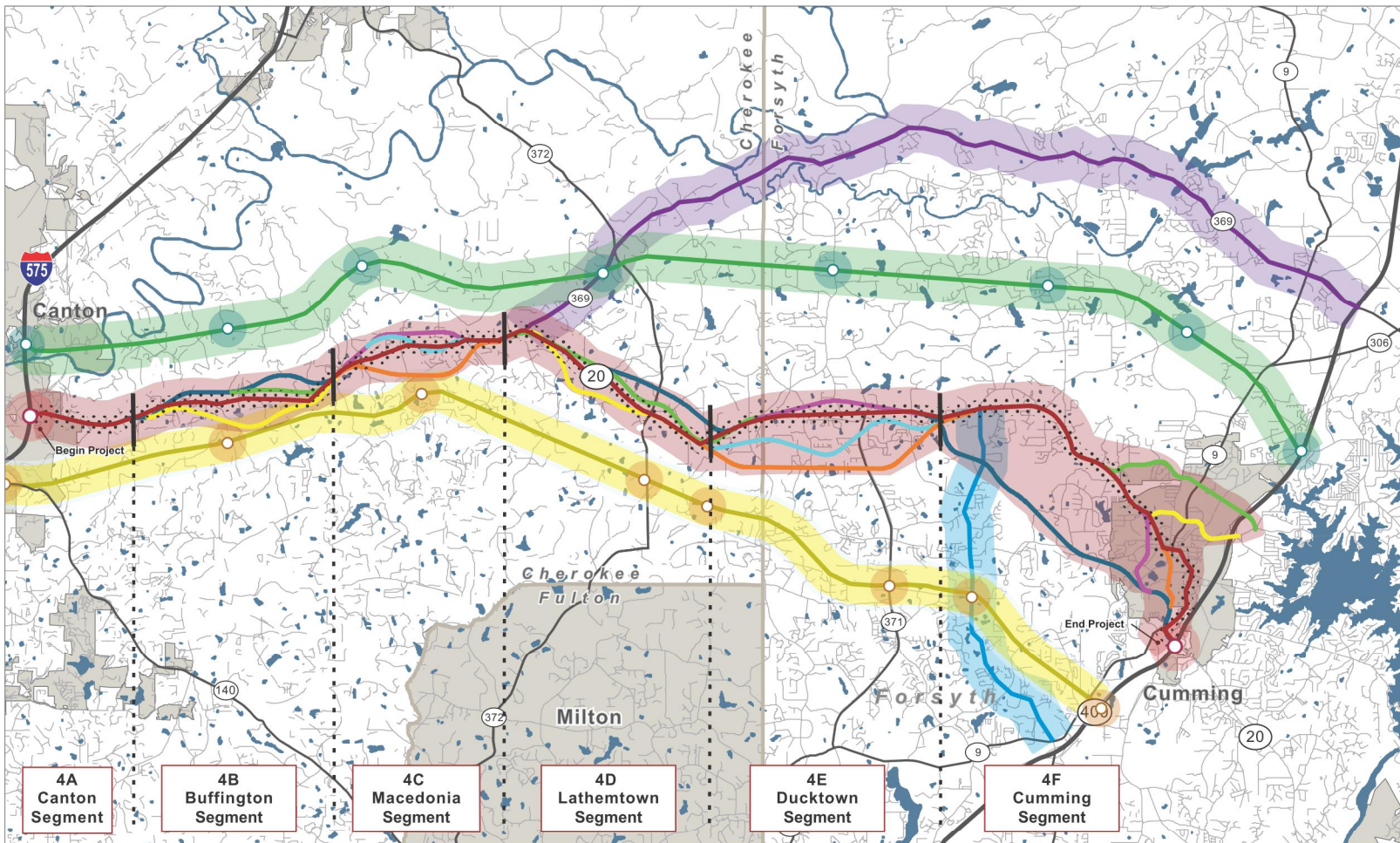
- Roll plots of 6-lane w signal and RCUT locations as well as edge of pavement for 4-lane scenario
- Handout: Corridor Map w/ PI Delineations & Laneage Requirements, Laneage Needs Spreadsheet, Typical Sections

Brief Project Description		SR 20 Improvements from Scott Road to N. Corners Parkway (PIs 0014131, 0014132, 0014133, 0002862, 0003682)					
Date of Open House		12-6-2016		End of Comment Period		12-30-2016	
Number in Attendance		312					
Officials in Attendance (list name and title)		Scott Morgan, Representing City of Cumming Paul Oh, Representing Congressman Rob Woodall Media Present: Forsyth Herald, Forsyth County News					
Comment Breakdown (for comments provided at the Open House) 6 total written comments received.							
For	17	Conditional	10	Uncommitted	2 (plus 2 who didn't answer)	Against	2
Major concerns:		<p>In general, the project received support. The following were concerns voiced at the meeting:</p> <ul style="list-style-type: none"> -Access and/or impacts to personal property and businesses, -Increased truck traffic, -Questions about benefits of restricted U-turn design, -Questions about why the project ends west of Cumming and does not continue to SR 400, -Design suggestions for specific locations, - Questions about what makes a property historic 					
Prepared by (include firm's name if applicable):		Leah Vaughan, Sycamore Consulting, Inc.					

<i>Brief Project Description</i>		SR 20 Improvements from Scott Road to N. Corners Parkway (PIs 0014131, 0014132, 0014133, 0002862, 0003682)					
<i>Date of Open House</i>		12-15-2016		<i>End of Comment Period</i>		12-30-2016	
513		312					
<i>Officials in Attendance (list name and title)</i>		State Representative Wes Cantrell Beatrice Torralba, Representing Senator David Perdue Geoff Morton, Cherokee County Media Present: Cherokee Tribune					
<i>Comment Breakdown (for comments provided at the Open House) 6 total written comments received.</i>							
<i>For</i>	8	<i>Conditional</i>	15	<i>Uncommitted</i>	3 (plus 1 who didn't answer)	<i>Against</i>	1
<i>Major concerns:</i>		<p>Anecdotally, the project received wide-spread support. The reporter from the Cherokee paper noted that he had never seen as many happy people at a PIOH. Of the written comments received, there were several major categories of concern:</p> <ul style="list-style-type: none"> • Access and/or impacts to personal property and businesses, specifically related to the addition of a median/RCUTS; • Questions about benefits of the median and restricted U-turn design; • Concern about fair and speedy relocation/compensation for displacement properties and/or a desired for complete taking rather than having the road too close to homes; • Impact of increased noise and pollution; • Requests for traffic signals; • Tractor trailer traffic access to industrial park, other businesses where U-turns will be difficult. • Design suggestions for specific locations; and • Appreciation for the design and process. 					
<i>Prepared by (include firm's name if applicable):</i>		Leah Vaughan, Sycamore Consulting, Inc.					

Attachment 10

Screen 2 Conceptual Alternatives



Legend

- Conceptual Alternative 2
Widen Existing
(formerly Alt-B)
- Conceptual Alternative 3A
New Location North
(formerly Alt-A)
- Conceptual Alternative 3B
New Location South
(formerly Alt-C)
- Conceptual Alternatives 4
Combination Alt 2 and
Localized Bypasses
(formerly Alt-B)
- Conceptual Alternative 5A
Combination of Alt 4 to
SR 369; cosign SR 369
as SR 20
- Conceptual Alternative 5B
Combination of Alt 4 to
Bethelview Road; cosign
Bethelview Road as SR 20

Note: Conceptual Alternative 0 - No Build and Conceptual Alternative 1 - Transportation Systems Management are not shown on the map.

21.0 DISPLACEMENTS

Displacements presented in the table below distinguish between total displacements of a conceptual alternative and displacements per mile. Each table is formatted so that the Total column indicates both the total displacements and the rate of displacements per mile. It should be noted that displacements are not evenly distributed throughout the corridor. For example, in densely populated areas, clusters of displacements may occur. Therefore, the rate per mile does not differentiate between densely or sparsely populated areas. The number outside the parentheses represents the total displacements, while inside the rate of displacements. For example, Conceptual Alternative 3A shows 287 (12.7), so that this conceptual alternative has 287 total displacements at a rate of 12.7 displacements per mile. The figures below provide a summary of both combined displacements and rate of displacements per mile. The estimated number of displacements will serve as a proxy until a detailed assessment for each alternative is conducted in accordance with GDOT's Environmental Procedures Manual in the DEIS phase of project development.

In order to aggregate the number of potential displacements, aerial imagery was used to identify impacted structures for each alternative. The corridor was flown in 2012 to obtain geo-referenced, aerial imagery; however, several of the alternatives fall outside the extents of these aerials. Therefore, these aerials were supplemented with 2010 aerials that are publicly available from the United States Department of Agriculture and Google Maps aerials/street view (where available). Based on comparing active construction sites along the corridor, the 2012 aerial imagery and the current Google Maps aerial imagery were collected at similar times.

Cherokee and Forsyth counties provided their latest parcel maps within the study area. This data, along with the impacted structures and Google Maps aerials/street view, was used to identify displacements. Displacements are different than impacted structures because one building does not necessarily constitute one displacement. For example, if one parcel has a house with a separate garage, it would be counted as two structures but only one displacement. Similarly, a strip mall could have one building but hold multiple businesses and was therefore counted as multiple displacements.

Land use maps were provided by Cherokee and Forsyth counties and were used, along with aerials and Google Maps aerials/street view, to identify type of displacement. In the case of a discrepancy between sources, professional judgment was used to assign displacement type. The types of displacement identified are residential, commercial, industrial, and institutional.

Residential displacements include residences, such as houses and apartment complexes. Each house was considered one displacement. Displacements for apartment complexes were estimates based on building height. If a townhome building was impacted, only the townhomes the alternative touched were considered displacements; it was assumed that the building could be renovated to preserve the remaining townhomes.

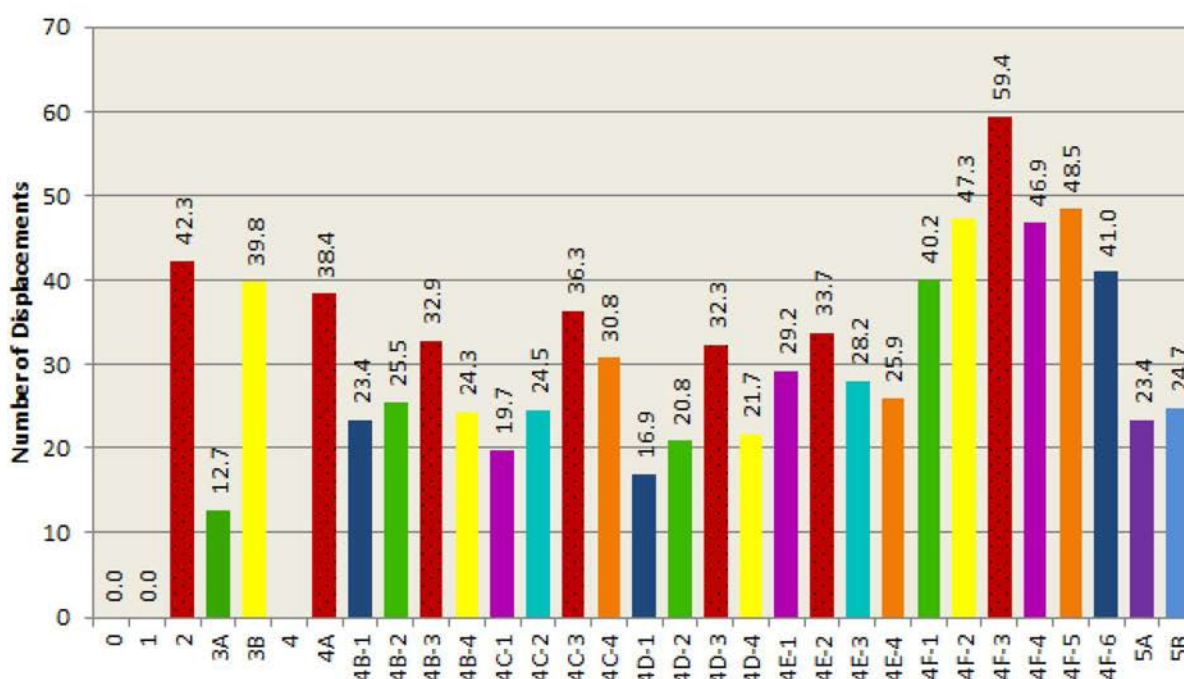
Commercial displacements include businesses and agricultural facilities, such as barns and chicken coops. The number of businesses in a building was estimated using Google Maps street view. Similar to townhome buildings, if a strip mall building was impacted, only the businesses the alternative impacted were considered displacements.

Industrial displacements include manufacturing facilities, poultry plants, and treatment plants.

Institutional displacements include public facilities such as schools, churches, government facilities, and utility sites. Common facilities in neighborhoods (i.e. tennis courts, pools, etc.) were also considered institutional displacements.

The following figure and table provides the dataset of potential displacements, which were calculated using aerial photography.

Figure 21.1 Potential Quantitative and Qualitative Displacements per Mile - All Conceptual Alternatives



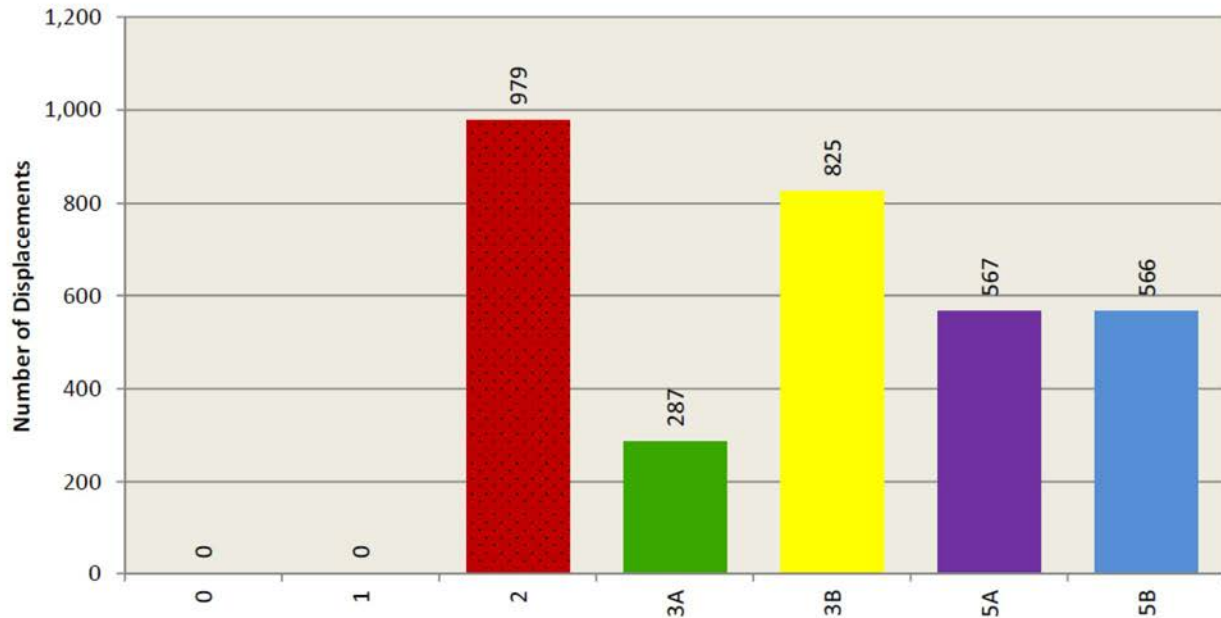
Source: Cherokee and Forsyth counties parcel maps, aeriels, and Google Maps imagery

*Note: Preliminary impacts for tables and figures are based on a high level of GIS analysis. As detailed analyses are conducted, and alternatives are refined, impacts to various resources may change.

**Note: The lengths for Alternative 4 will be determined after various links are analyzed in subsequent analyses. The shortest distance for Alternative 4 would be 23.20 miles and the longest distance would be 25.43 miles.

***Note: Displacements may occur in clusters within densely populated areas.

Figure 21.2 Potential Total Displacements - Corridor Alternatives

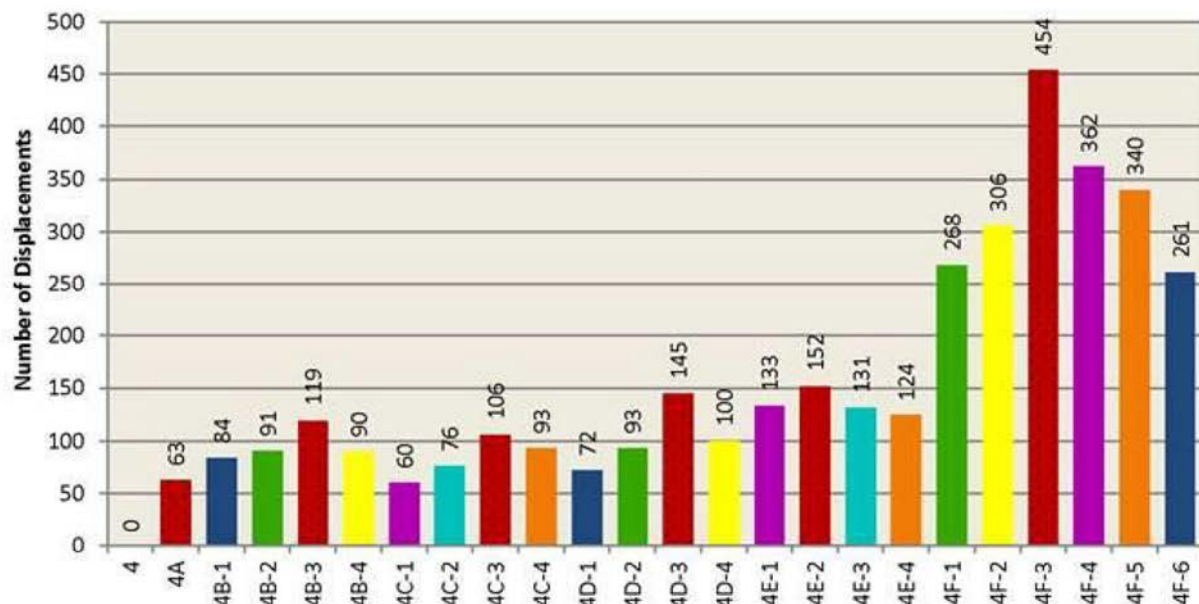


Source: Cherokee and Forsyth counties parcel maps, aerials, and Google Maps imagery

*Note: Preliminary impacts for tables and figures are based on a high level of GIS analysis. As detailed analyses are conducted, and alternatives are refined, impacts to various resources may change.

**Note: The lengths for Alternative 4 will be determined after various links are analyzed in subsequent analyses. The shortest distance for Alternative 4 would be 23.20 miles and the longest distance would be 25.43 miles.

Figure 21.3 Potential Total Quantitative and Qualitative Displacements - Conceptual Alternatives - Links



Source: Cherokee and Forsyth counties parcel maps, aeriels, and Google Maps imagery

*Note: Preliminary impacts for tables and figures are based on a high level of GIS analysis. As detailed analyses are conducted, and alternatives are refined, impacts to various resources may change.

**Note: The lengths for Alternative 4 will be determined after various links are analyzed in subsequent analyses. The shortest distance for Alternative 4 would be 23.20 miles and the longest distance would be 25.43 miles.

Table 21.1 Potential Displacements

Conceptual Alternative	Length of Corridor (miles)	Total Displacements (per mile)	Residential	Commercial	Industrial	Institutional	Qualitative
0	0	0 (0)	0	0	0	0	●
1	0	0 (0)	0	0	0	0	●
2	23.16	979 (42.3)	415	523	6	35	●
3A	22.61	287 (12.7)	251	32	0	4	●
3B	20.73	825 (39.8)	770	50	0	5	●
4A	1.64	63 (38.4)	32	31	0	0	●
4B-1	3.59	84 (23.4)	64	19	0	1	●
4B-2	3.57	91 (25.5)	71	19	0	1	●
4B-3	3.62	119 (32.9)	81	33	0	5	●
4B-4	3.70	90 (24.3)	78	9	0	3	●
4C-1	3.05	60 (19.7)	52	7	0	1	●
4C-2	3.1	76 (24.5)	65	10	0	1	●
4C-3	2.92	106 (36.3)	71	32	0	3	●
4C-4	3.03	93 (30.8)	85	6	0	2	●
4D-1	4.25	72 (16.9)	56	15	0	1	●
4D-2	4.47	93 (20.8)	69	22	1	1	●
4D-3	4.49	145 (32.3)	76	62	2	5	●
4D-4	4.61	100 (21.7)	63	36	0	1	●
4E-1	4.56	133 (29.2)	86	40	2	5	●
4E-2	4.51	152 (33.7)	82	61	3	6	●

Table 21.1 Potential Displacements

Conceptual Alternative	Length of Corridor (miles)	Total Displacements (per mile)	Residential	Commercial	Industrial	Institutional	Qualitative
4E-3	4.65	131 (28.2)	117	12	1	1	●
4E-4	4.78	124 (25.9)	114	8	1	1	●
4F-1	6.67	268 (40.2)	177	73	2	16	●
4F-2	6.47	306 (47.3)	137	143	2	24	○
4F-3	7.64	454 (59.4)	106	328	3	17	○
4F-4	7.27	341 (46.9)	115	204	7	15	○
4F-5	7.48	363 (48.5)	184	145	11	23	○
4F-6	6.36	261 (41.0)	190	49	15	7	●
5A	24.28	567 (23.4)	375	170	3	19	●
5B	16.65	566 (34.0)	327	216	5	18	●

Source: Cherokee and Forsyth counties parcel maps, aerials, and Google Maps imagery

*Note: Preliminary impacts for tables and figures are based on a high level of GIS analysis. As detailed analyses are conducted, and alternatives are refined, impacts to various resources may change.

**Note: The lengths for Alternative 4 will be determined after various links are analyzed in subsequent analyses. The shortest distance for Alternative 4 would be 23.20 miles and the longest distance would be 25.43 miles.

Widening the existing SR 20 would result in 979 total displacements. About 53% of these displacements are commercial displacements, as there are many businesses along the existing road. This alternative has the largest number of displacements of any alternative and was rated as Needs Improvement. The Northern New Location alternative (3A) displacements are mostly residential (~87%). As this alternative has one of the lowest rates of displacements (12.7 displacements per mile), it receives a rating of Exceeds. The Southern New Location alternative (3B) has over 2.5 times the displacements of the Northern New Location. These displacements are still primarily residential (~93%). About a third of the residential displacements come from impacting an apartment complex next I-575. These could potentially be avoided by shifting the alignment to the north or south. This alternative rates as Meets due to its moderate rate of displacements.

The Canton link from I-575 to Buffington has an almost equal amount of residential and commercial displacements. The majority of commercial displacements are a result of the impact to the Canton Marketplace. This alternative rates as Meets due to its moderate rate of displacements.

4B-1 has the least amount of total displacements at 84, while 4B-3 has the most at 119. All alignments result in primarily residential displacements, ranging from 87% for 4B-4 to 68% for

4B-3. There are no industrial displacements for any of the alternatives and relatively few institutional displacements. 4B-1 rates as Exceeds, while the other alternatives rate as Meets.

4C-1 has the least amount of total displacements at 60, while 4C-3 has the most at 106. All of these alternatives result in primarily residential displacements. Compared to the other areas along the corridor, the Macedonia alternatives have a relatively low number of displacements. 4C-1 receives a rating of Exceeds, while 4C-2, 4C-3, and 4C-4 receive a rating of Meets.

4D-1 has the least amount of total displacements at 72, while 4D-3 nearly doubles that amount with the most total displacements at 143. The majority of displacements for 4D-1, 4D-2, and 4D-4 are residential, while 4D-3 is comprised of a more even spread between residential and non-residential displacements. All the Lathemtown alternatives receive a rating of Exceeds, except for 4D-3, which receives a rating of Meets.

4D-4 has the least amount of total displacements at 124, while 4D-3 has the most at 150. Compared to the other areas along the corridor, all the alternatives for Ducktown have a relatively high number of total displacements. 4D-3 and 4D-4 have a very high percentage of residential displacements, while the displacements for 4D-1 and 4D-2 are more evenly distributed. All of these alternatives receive a rating of Meets.

Although 4F-6 has the least amount of total displacements at 261, it also has the most residential displacements at 190. 4F-3 has the most total displacements at 451, but the least amount of residential displacements at 106. As expected, widening along the existing corridor (4F-3) has the most amount of commercial displacements by far. Compared to the other areas, the displacements resulting from these alternatives are more evenly distributed between residential and non-residential, as they are going through the more developed areas of the City of Cumming. 4F-1 and 4F-6 receive a rating of Meets; the rest of the conceptual alternatives in Cumming receive a rating of Needs Improvement.

5A would result in 567 total displacements, with about 66% of those being residential displacements. 5B assumes that SR 20 will be widened from I-575 to Bethelview, then diverted onto the existing Bethelview Rd (programmed to be constructed in 2014/2015); this alternative would result in 566 total displacements. Both of these partial rerouting alternatives receive a rating of Meets.

2.4 Costs/Other

2.4.1 Costs/Other Summary

Costs evaluated in Screen 2 are based on anticipated right of way (ROW), construction (CST), and operations and maintenance costs. ROW costs primarily reflect the amount of additional land (i.e. acres) required for acquisition including improvements, where price variability occurs by land use type (e.g. commercial, residential, agricultural, and industrial). Cost of construction was developed by estimating the main drivers of roadway construction and applying average percentage factors to develop costs for the secondary drivers. The two main drivers for construction costs are pavement (e.g. travel lanes and shoulders) and structures (e.g. bridges) and are estimated by using unit costs for the proposed areas. Secondary drivers for pavement consist of drainage, erosion control, signs, pavement markings, traffic control, and earthwork. Average percentage factors were developed by analyzing historic GDOT project costs and are indexed to the cost of the pavement. Structures do not have any secondary drivers for their construction costs. The factors impacting both ROW and CST cost estimates were calculated via desktop analyses. Costs at this phase are preliminary and are subject to change as detailed analyses are performed.

In order to illustrate the relationship of project costs with potential benefits a conceptual alternative can produce, a B/C ratio was calculated for each conceptual alternative (i.e. return on the dollar). The B/C ratio works to compare the user benefits of the conceptual alternative to the construction cost. The B/C ratio was developed based on correlating the benefits of the project with the project Need and Purpose, specifically, in the alternative's ability to address mobility and congestion relief needs.

One conclusion of the Costs/Other Evaluation was the need to develop a specific Marginal Utility Analysis. A marginal utility analysis could be used to quantify the how well an alternative performs for its cost. This analysis is provided in Appendix B.

Table 2.35 illustrates the Costs/Other criteria and the units of analysis that were used for each conceptual alternative. The ratings used for Costs/Other include 'Exceeds', 'Meets', and 'Needs Improvement'. Following this table is a discussion of each Costs/Other criteria, a brief discussion of what the criterion is, how it was assessed, and how the qualitative ratings were applied (to be completed upon agency coordination).

Section 3 provides a comprehensive summary of all performance results. Appendix A provides data for environmental and community impacts results from Screen 2 for each conceptual alternative. Appendix B provides further details of the approach, assumptions, and context for evaluation as well as providing results for each criterion.

Table 2.34 Costs/Other Criteria

Performance Criteria*	Units
Total Costs (including Right of Way, Construction, Operations and Maintenance)	\$ (Million)
Benefit/Cost Ratio	B/C
Constructability	Qualitative

*Analysis of these criteria is provided in Sections 2.4.2 – 2.4.7. A summary of results is found in Appendix A, Screen 2 Comprehensive Matrix. Detailed analysis of these criteria is found in Appendix B.

2.4.2 Cost Summary

Project costs were based on the right of way (ROW) costs, construction (CST) costs, and operations and maintenance costs, but the alternatives' costs were grouped into one lump sum category to help illustrate the comprehensive amount of capital investment necessary to construct and maintain each alternative. Among the alternatives, there was an extensive amount of variability in ROW and CST costs to the extent that comparing them could prove challenging. Therefore, to account for this variability, alternatives' total project costs were reported as one lump sum of ROW and CST costs. The costs for operations and maintenance were considered negligible since this component accounted for such a low percentage of the total project costs. Costs at this phase are preliminary and are subject to change as detailed analyses are performed.

The costs for conceptual alternatives 3A and 3B were exorbitantly higher than the other corridor widening alternatives, so they were rated as 'Needs Improvement' due to these being over double the average costs of the other widening alternatives (e.g. \$615.6 million and \$630.2 million, respectively). The average costs for conceptual alternatives 2, 5A, and 5B was \$252 million; each of these conceptual alternatives had costs that fell within the range of the average, therefore received a 'Meets' rating. The average combined ROW and CST costs were \$68.1M per link for conceptual alternatives 4A, 4B-(1, 2, 3, 4), 4C-(1, 2, 3, 4), 4E-(1, 2, 3, 4), and 4F-(1, 2, 3, 4, 5, 6), therefore all conceptual alternatives with costs falling within the range of greater than \$40 million but less than \$80 million were considered within the average and received a 'Meets' rating. The conceptual alternatives that were \$40 million or less received an 'Exceeds' rating. The TSM conceptual alternative 1 had an estimated cost slightly over \$2 million due to the type of improvements being minor in nature, especially since it may not require or only require a minimum amount of ROW. Conceptual alternatives 4A and 4C-3 had project costs under or equal to \$40 million. The threshold applied for the 'Needs Improvement' rating was project costs exceeding \$80 million, which applied to conceptual alternative 4E-4 and conceptual alternatives 4F-1 thru 6.

Due to the project costs having natural breaks in terms of the cost differential among the alternatives, it assisted with the establishment of the thresholds for which the qualitative ratings were based. A conceptual alternative's cost was not the key determinant factor for evaluating its overall rating; however project costs did have an impact due to it helping

illustrate the degree of monetary investment necessary for implementing a specific alternative.

Ratings Justification: The qualitative ratings used to assess the impact of a conceptual alternative's costs were Exceeds, Meets, and Needs Improvement based on natural breaks. If an alternative's project costs were considerably lower than other alternatives' costs, then it received an 'Exceeds' rating. Alternatives with project costs that fell more in line with the average project costs received a 'Meets' rating. For the cases where an alternative's project costs were considerably higher than the average project costs or were so high that it was challenging to draw practical comparisons, those alternatives received a 'Needs Improvement'.

Table 2.35 Total Costs Qualitative Ratings

Rating	Legend	Alternative(s)
Exceeds	●	<div>0 - No Build</div> <div>1 - Transportation Systems Management</div> <div>4A-1 - Canton Red (Existing)</div> <div>4C-3 - Macedonia Red (Existing)</div> <div>4C-4 - Macedonia Orange (South)</div>
Meets	◐	<div>2 - Widen Existing</div> <div>4B-1 - Buffington Blue (North)</div> <div>4B-2 - Buffington Green (North)</div> <div>4B-3 - Buffington Red (Existing)</div> <div>4B-4 - Buffington Yellow (South)</div> <div>4C-1 - Macedonia Pink (North)</div> <div>4C-2 - Macedonia Teal (North)</div> <div>4D-1 - Lathemtown Blue (North)</div> <div>4D-2 - Lathemtown Green (North)</div> <div>4D-3 - Lathemtown Red (Existing)</div> <div>4D-4 - Lathemtown Yellow (South)</div> <div>4E-1 - Ducktown Pink (North)</div> <div>4E-2 - Ducktown Red (Existing)</div> <div>4E-3 - Ducktown Teal (South)</div> <div>5A - Alt 4 and SR 369</div> <div>5B - Alt 4 and Bethelview</div>
Needs Improvement	○	<div>3A - North</div> <div>3B - South</div> <div>4E-4 - Ducktown Orange (South)</div> <div>4F-1 - Cumming Green (Sawnee Dr.)</div> <div>4F-2 - Cumming Yellow (Elm St.)</div> <div>4F-3 - Cumming Red (Existing)</div> <div>4F-4 - Cumming Pink (Tolbert St.)</div> <div>4F-5 - Cumming Orange (Veterans Memorial Blvd.)</div> <div>4F-6 - Cumming Blue (Chamblee Gap Rd.)</div>

Note: Costs at this phase are preliminary and are subject to change as detailed analyses are performed.

2.4.3 Right of Way

The tools used to determine the number and type of land use impacts were GIS and county land use and zoning maps for Forsyth and Cherokee Counties. The primary tool used for calculating ROW costs based on the pre-determined ROW impacts was GDOT's Office of Planning RUCEST (Right of Way and Utility Relocation Cost Estimate Tool). This tool is used to develop right of way planning level cost estimates for a diverse set of project types, ranging from auxiliary lanes, bridges, frontage roads, multi-use trails, turn lanes, sidewalks, roundabouts, and traditional widening projects. The pricing variables used within RUCEST are derived from actual historical data from previously let projects in coordination with GDOT's ROW Office and its Utility Office. Assumptions concerning ROW primarily involved the determination of ROW width (assumed to be 250 feet for conceptual alternatives 2, 4A, 4B[1, 2, 3, 4], 4C[1, 2, 3, 4], 4D[1, 2, 3, 4], 4E[1, 2, 3, 4], 4F[1, 2, 3, 4, 5, 6], 5A and 5B; and assumed to be 300 feet for conceptual alternatives 3A and 3B), inventorying land use types (i.e., commercial, residential, industrial, agricultural), and counting the number of improvements and displacements by land use type. Additionally, the particular county an alternative was located is a significant variable to capture. Appendix B provides additional details on the evaluation of this criterion. Costs at this phase are preliminary and are subject to change as detailed analyses are performed.

2.4.4 Construction

Construction costs estimates for this analysis also include bridges and interchanges. The assumptions for pavement widths are 65 feet for four lane facilities; 89 feet for six lane facilities, and 92 feet for conceptual alternatives 3A and 3B. The primary tool utilized for calculating construction costs is GDOT's CES (Cost Estimating System).

There was variability in costs for roadway segments on existing alignment compared to segments on new alignment; the same applies to the contingency percentage as well which is covered in a later section of this report. The differential between new alignment and existing alignment is attributed to the amount of earthwork necessary, whereas less earthwork is required for widening on existing alignment compared to a substantial amount more required for new alignments segments. Appendix B provides additional details on the evaluation of this criterion. Costs at this phase are preliminary and are subject to change as detailed analyses are performed.

2.4.5 Operations and Maintenance

Calculating the anticipated costs of maintaining a new or improved roadway facility for SR 20 is captured in operations and maintenance. These costs are typically based on maintaining quality pavement, bridges, and signage along the corridor; however, most of these cost items are difficult to project due to them being based on the severity of need as well as being tied to scheduled inspections. Therefore, operations and maintenance costs were based on resurfacing, since resurfacing needs are easily foreseeable and anticipated. It was assumed that a roadway facility will be resurfaced at least twice within its 20 year design life. The key driver in resurfacing costs is the amount of pavement needed (i.e. square yard and tonnage).

Costs are expressed in terms of annual projections by dividing the total construction costs by 20 to represent the design life of twenty years. The total construction costs are based on the total number of miles to repave/resurface. The constant variable used for each conceptual alternative was \$54 per ton for asphalt. Appendix B provides additional

details on the evaluation of this criterion. Costs at this phase are preliminary and are subject to change as detailed analyses are performed.

2.4.6 Benefit/Cost Ratio

The Benefits-to-Cost (B/C) Ratio developed for this project measures the benefits, as related to the Need and Purpose objectives, and compares them to the total project costs. The Need and Purpose objectives for the SR 20 Corridor Improvements project are: improve Mobility, reduce Congestion, and improve Safety along the corridor. Mobility can be measured using monetized travel time savings and is the basis of the B/C ratio. Congestion reduction is discussed further in Appendix B, and safety could not be included at this time due to the complexity of the analysis being inconsistent with the level of design at this Screen 2 Alternatives Analysis phase.




The benefit calculated for the B/C ratio represents, in dollars, the time saved for a single user on a single trip if a conceptual alternative were constructed. The cost calculated for the B/C ratio represents the total project cost (right-of-way acquisition and construction) required for that user to make the same trip. Appendix B provides additional details on the evaluation of this criterion.

Since this metric does not calculate monetized benefits associated with V/C ratio and safety improvements, its results should not be used as a primary criterion for decision-making. The results of this analysis provide a level of sensitivity to other, stronger criteria and should be used to fine-tune rankings of conceptual alternatives. If this metric is combined with the results of the marginal utility analysis, it can provide better clarity on how a particular conceptual alternative performs associated with the Need and Purpose objectives for this project. Costs at this phase are preliminary and are subject to change as detailed analyses are performed.

Ratings Justification: The natural breaks in the quantitative data fall into the following ranges and were assigned the corresponding qualitative ratings:

- B/C ratio > 3.8 - Exceeds
- $2.0 > \text{B/C ratio} < 3.8$ - Meets
- B/C ratio < 2.0 - Needs Improvement

Table 2.36 Benefit/Cost Qualitative Ratings

Rating	Legend	Alternative(s)
Exceeds		<div>1 - Transportation Systems Management</div> <div>4B-1 - Buffington Blue (North)</div> <div>4B-2 - Buffington Green (North)</div> <div>4B-3 - Buffington Red (Existing)</div> <div>4B-4 - Buffington Yellow (South)</div> <div>4C-4 - Macedonia Orange (South)</div> <div>4D-4 - Lathetown Yellow (South)</div> <div>4F-1 - Cumming Green (Sawnee Dr.)</div> <div>4F-6 - Cumming Blue (Chamblee Gap Rd.)</div>
Meets		<div>2 - Widen Existing</div> <div>3A - North</div> <div>3B - South</div> <div>4C-1 - Macedonia Pink (North)</div> <div>4C-2 - Macedonia Teal (North)</div> <div>4D-1 - Lathetown Blue (North)</div> <div>4D-2 - Lathetown Green (North)</div> <div>4E-1 - Ducktown Pink (North)</div> <div>4E-3 - Ducktown Teal (South)</div> <div>4E-4 - Ducktown Orange (South)</div> <div>4F-2 - Cumming Yellow (Elm St.)</div> <div>4F-3 - Cumming Red (Existing)</div> <div>4F-4 - Cumming Pink (Tolbert St.)</div> <div>4F-5 - Cumming Orange (Veterans Memorial Blvd.)</div> <div>5A - Alt 4 and SR 369</div>
Needs Improvement		<div>0 - No Build</div> <div>4A-1 - Canton Red (Existing)</div> <div>4C-3 - Macedonia Red (Existing)</div> <div>4D-3 - Lathetown Red (Existing)</div> <div>4E-2 - Ducktown Red (Existing)</div> <div>5B - Alt 4 and Bethelview</div>

Note: Costs at this phase are preliminary and are subject to change as detailed analyses are performed.

2.4.7 Constructability

The constructability measure for the SR 20 Alternatives Analysis provides a qualitative measure for the risks associated with the construction cost or overall project schedule. Risk identifies areas of uncertainty in the project's construction cost or overall project schedule that are reasonably foreseeable at the early stage in project development. The method for determining constructability for the SR 20 Corridor Improvement Project's alternatives consists of three categories: structural, roadway, and community impacts to schedule risks. Costs at this phase are preliminary and are subject to change as detailed analyses are performed.




- 1) Structural risks identify risks associated with the construction of major structures (bridges or tunnels), construction of roadway on embankment, and with right-of-way acquisition. Structural risks for cost and project schedule are mostly dependent on the number of structures constructed and the complexity of the construction. For example, standard GDOT bridges do not require complex construction techniques or staging practices to construct, whereas long-span bridges require complex staging and maintenance of traffic practices to properly construct. Additionally, a vast number of bridges on an alternative may increase its risk for cost (availability of materials) and/or schedule (takes longer to construct numerous bridges).
- 2) Roadway risks for cost and project schedule are mostly dependent on the complexity of construction staging or building the alternative under traffic. For example, a new location facility does not require much construction staging while vehicles are present, as the construction occurs in areas where no vehicles travel. Alternatively, a standard roadway widening provides a moderate level of risk to schedule as the construction of new roadway components must be constructed piecemeal as opposed to all at once. Lastly, very complex roadway staging typically requires extensive temporary pavement and several detours to construct under traffic.
- 3) Community Impacts to Schedule risks for cost and project schedule are mostly dependent on the number of properties required to acquire prior to the construction of the project. For example, in urban areas where there are numerous acquisitions, the project schedule can be highly uncertain as numerous negotiations with property owners must occur. However, in rural and largely undeveloped areas, right-of-way acquisition occurs at a fast pace as there are fewer property owners. Risks associated with construction cost typically are associated with improvements that are negotiated into the project. An example is for the Georgia DOT to construct a retaining wall on a property to minimize the total amount of property acquired.

Appendix B provides additional details on the evaluation of this criterion.

Ratings Justification: All three risk categories are aggregated together (for comparison purposes) to form an overall constructability rating. This constructability rating represents the total uncertainty to the construction cost and project schedule for an alternative. These evaluations are based solely on professional judgment by a licensed engineer.

- Exceeds – Low risk alternative
- Meets – Medium risk alternative
- Needs Improvement – High risk alternative

Table 2.37 Constructability Qualitative Ratings

Rating	Legend	Alternative(s)
Exceeds		<div>0 - No Build</div> <div>1 - Transportation Systems Management</div> <div>4A-1 - Canton Red (Existing)</div> <div>4B-1 - Buffington Blue (North)</div> <div>4B-2 - Buffington Green (North)</div> <div>4B-4 - Buffington Yellow (South)</div> <div>4C-1 - Macedonia Pink (North)</div> <div>4C-4 - Macedonia Orange (South)</div> <div>4D-1 - Lathemtown Blue (North)</div> <div>4D-2 - Lathemtown Green (North)</div> <div>4E-1 - Ducktown Pink (North)</div> <div>4E-3 - Ducktown Teal (South)</div> <div>4E-4 - Ducktown Orange (South)</div> <div>4F-1 - Cumming Green (Sawnee Dr.)</div> <div>4F-6 - Cumming Blue (Chamblee Gap Rd.)</div>
Meets		<div>2 - Widen Existing</div> <div>3A - North</div> <div>4B-3 - Buffington Red (Existing)</div> <div>4C-2 - Macedonia Teal (North)</div> <div>4C-3 - Macedonia Red (Existing)</div> <div>4D-3 - Lathemtown Red (Existing)</div> <div>4D-4 - Lathemtown Yellow (South)</div> <div>4E-2 - Ducktown Red (Existing)</div> <div>4F-2 - Cumming Yellow (Elm St.)</div> <div>4F-5 - Cumming Orange (Veterans Memorial Blvd.)</div> <div>5A - Alt 4 and SR 369</div> <div>5B - Alt 4 and Bethelview</div>
Needs Improvement		<div>3B - South</div> <div>4F-3 - Cumming Red (Existing)</div> <div>4F-4 - Cumming Pink (Tolbert St.)</div>

* Note: The lengths for Alternative 4 will be determined after various links are analyzed in subsequent analyses. The shortest distance for Alternative 4 would be 23.20 miles and the longest distance would be 25.43 miles.

SR 20 Improvements (Canton to Cumming)			Alternatives								
PF's: 0003681, 0002862, 0003682			0. No Build	1. Transportation Systems Mgmt (Localized Improvements)	1. Qualitative	2. Water Routing	2. Qualitative	3A. New Location (North)	3A. Qualitative	3B. New Location (South)	3B. Qualitative
Screen 2 Performance Criteria	Units										
Performance	Travel Time Savings (2040)	Minutes (Total)	total congested trip time 197 minutes	qualitative	F	reduced by 75 minutes	E	reduced by 67 minutes	E	reduced by 77 minutes	E
	User Benefits	Hours of Delay (Total)	11,200 cumulative hours of delay	qualitative	F	reduced by 2,700	M	reduced by 6,000	E	reduced by 7,200	E
		Fuel Saved (per capita)	Cumulative consumption 510 gallons	qualitative	F	88.2	E	94.5	E	101.6	E
	Level of Service (2040)	Volume / Capacity Ratio (V/C)	1.03	qualitative	F	0.93	F	0.95	F	0.89	F
	Travel Time Index (2040)	Free Flow/ Congested Travel Time	2.28	qualitative	F	1.85	M	1.94	M	1.80	M
	Access to Employment Centers (2040)	# of Origin / Destination (O/D) Trips in Canton/Cumming Only	320,400 total trips	qualitative	F	318,200	M	318,300	F	317,500	F
	Access management	Qualitative	F	F	F				M		M
	Safety	Qualitative	F	F	F				M		M
Overall Performance			F		F		F		F		F
Potential Environmental and Community Impacts	Streams	Linear Feet (Linear Feet/mile)	0	0	E	11,985.3 (491.8)	M	35794.9 (1583.1)	Ni	39834 (1921.6)	Ni
	Wetlands	Acres (Acres/mile)	0	0	E	2.1 (0.1)	M	4.9 (0.2)	Ni	19.3 (0.9)	Ni
	Lakes & Ponds	Acres (Acres/mile)	0	0	E	1.4 (0.1)	M	2.2 (0.1)	M	6.9 (0.3)	Ni
	Floodplains	Acres (Acres/mile)	0	0	E	26.8 (1.3)	M	128.7 (5.7)	Ni	203.4 (9.8)	Ni
	Conservation Areas/Parks/Section 4(f)	Acres (Acres/mile)	0	0	E	25.8 (1.1)	Ni	12.3 (0.5)	Ni	0 (0)	E
	Land and Water Conservation/Section 6(f)	Acres (Acres/mile)	0	0	E	4.3 (0.2)	Ni	0 (0)	E	0 (0)	E
	Protected Species Areas	Linear feet of streams with darter habitat (Linear feet of streams/mile)				2396.3 (102.2)	E	35496 (1,583.2)	Ni	22840 (1,101.8)	Ni
	Protected Species	#	0	0	E	6	Ni	6	Ni	6	Ni
	Noise Receptors	# (#/mile)	0 (0)	0 (0)	E	879 (42.3)	M	287 (12.7)	E	825 (39.8)	M
	Environmental Justice Population (Low-Income)	% low-income block groups of total block groups intersected by alternative	0	0	E	43.9%	M	60.0%	Ni	31.3%	M
	Environmental Justice Population (Minority)	% minority block groups of total blockgroups intersected by alternative	0	0	E	34.8%	M	33.3%	M	37.5%	M
	Farmland	Acres (Acres/mile)	0 (0)	0 (0)	E	338.3 (8.4)	E	364.5 (17.1)	M	492.4 (23.8)	Ni
	Number of Displacements	# of Structures (#/mile)	0 (0)	0 (0)	E	319 (12.3)	M	287 (12.7)	E	825 (39.8)	M
	Residential	# of Structures	0	0		415		251		770	
	Commercial	# of Structures	0	0		523		32		50	
	Industrial	# of Structures	0	0		6		0		0	
	Institutional	# of Structures	0	0		38		4		5	
	Potential Historic Properties/Section 4(f)	# of properties with structures over 45 years of age (acres)/#(mile)	0 (0)	0 (0)	E	496 (174.22) / (17.5)	Ni	64 (392.75) / (2.83)	M	84 (357.27) / (4.05)	M
	Potential Archaeological Sites/Section 4(f)	# of pre-recorded archaeological sites	0	0	E	4	M	2	Ni	5	M
	Cemeteries	#	0	0	E	2	Ni	0	E	2	Ni
	Native American Interests	#	0	0	E	6	E	2	Ni	3	M
	Air Quality	Qualitative	N/A		M		M		M		M
	Indirect and Cumulative Effects	Qualitative	M		M		M		M		M
	Construction Impacts	Qualitative	E		E		Ni		E		M
	Mitigation / Avoidance Potential (\$Million)*	Qualitative	E (0)		E (0)		Ni (0.8)		M (8.3)		M (9.1)
Overall Impacts			E		E		M		M		M
Costs/ Other	Total Costs	\$ (Million)	0 (E)	2.82	E	200.22	M	616.42	Ni	630.86	Ni
	Right of Way (250')	\$ (Million)	0	N/A		137.1		94		88.9	
	Construction	\$ (Million)	0	2.3		149.8		521.7		541.3	
	Operations & Maintenance	\$ (Million) /year	0.52	0.52		0.52		0.72		0.66	
	Benefit/Cost Ratio	B/C	Ni	qualitative	E	1.0	M	2.3	M	2.5	M
	Constructability	Qualitative	E		E		M		M		Ni
	Marginal Utility	Qualitative	Ni		Ni		M		Ni		Ni
	Overall Costs	Qualitative	Ni		Ni		M		Ni		Ni
Overall			F		F		M		F		F

Legend:
 E- Exceeds; M- Meets; Ni- Needs Improvement
 * Environmental Mitigation (Wetlands/Streams only)/ Individual Permit Anticipated on 2, 3A/B, 4A-F, 5A/B
 Distances of Alternatives:
 0 = 0 miles; 1 = 300 ft from intersections; 2 = 23.1 miles;
 3A = 22.6 miles; 3B = 20.7 miles;
 4A = 1.6 miles; 4B-1 = 3.59 miles; 4B-2 = 3.57 miles; 4B-3 = 3.62 miles; 4B-4 = 3.70 miles;
 4C-1 = 3.05 miles; 4C-2 = 3.10 miles; 4C-3 = 2.91 miles; 4C-4 = 3.03 miles;
 4D-1 = 4.25 miles; 4D-2 = 4.47 miles; 4D-3 = 4.49 miles; 4D-4 = 4.61 miles;
 4E-1 = 4.56 miles; 4E-2 = 4.51 miles; 4E-3 = 4.65 miles; 4E-4 = 4.78 miles;
 4F-1 = 6.67 miles; 4F-2 = 6.47 miles; 4F-3 = 7.64 miles; 4F-4 = 7.27 miles; 4F-5 = 7.48 miles;
 4F-6 = 6.36 miles;
 5A = 24.3 miles; 5B = 22.9 miles (environmental analysis length of 16.65 miles)
 **Note: The lengths for Alternative 4 will be determined after various links are analyzed in subsequent analyses. The shortest distance for Alternative 4 would be 23.20 miles and the longest distance would be 25.43 miles.



SR 20 Improvements (Canton to Cumming)			Alternatives									
PI's: 0003681, 0002862, 0003682			4A. Canton		4B. Buffington							
Screen 2 Performance Criteria	Units		4A. 1-875 to South Road	4A. Qualitative	4B-1 Blue (North)	4B-1 Qualitative	4B-2 Green (North)	4B-2 Qualitative	4B-3 Red (Fading)	4B-3 Qualitative	4B-4 Yellow (South)	4B-4 Qualitative
Performance	Travel Time Savings (2040)	Minutes (Total)	reduced by 0 minutes	F	reduced by 27 minutes	E	reduced by 27 minutes	E	reduced by 22 minutes	E	reduced by 27 minutes	E
	User Benefits	Hours of Delay (Total)	increased by 300	F	reduced by 2,300	E	reduced by 2,300	E	reduced by 1,800	E	reduced by 2,300	E
		Fuel Saved (per capita)	0.8	M	13	M	13.3	M	14.3	M	13.3	M
	Level of Service (2040)	Volume / Capacity Ratio (V/C)	0.63	M	0.46	M	0.46	M	0.8	M	0.46	M
	Travel Time Index (2040)	Free Flow/ Congested Travel Time	1.48	M	1.11	E	1.11	E	1.5	M	1.11	E
	Access to Employment Centers (2040)	# of Origin / Destination (O/D) Trips in Canton/Cumming Only	335,000	M	335,800	E	335,800	E	335,000	E	335,800	E
	Access management	Qualitative	M	M	M	M	M	M	M	M	M	M
	Safety	Qualitative	M	M	M	M	M	M	M	M	M	M
	Overall Performance	Qualitative		F		M		M		M		M
	Streams	Linear Feet (Linear Feet/mile)	0 (0)	E	3328.4 (927.1)	M	2378.2 (666.3)	M	0 (0)	E	1696.5 (458.5)	M
Potential Environmental and Community Impacts	Wetlands	Acres (Acres/mile)	0 (0)	E	0 (0)	E	0 (0)	E	0 (0)	E	0 (0)	E
	Lakes & Ponds	Acres (Acres/mile)	0 (0)	E	0 (0)	E	0 (0)	E	0 (0)	E	0 (0)	E
	Floodplains	Acres (Acres/mile)	0 (0)	E	0 (0)	E	0 (0)	E	0 (0)	E	0 (0)	E
	Conservation Areas/Parks/Section 4(f)	Acres (Acres/mile)	0 (0)	E	0 (0)	E	0 (0)	E	4,311.75	Ni	0.9 (0.3)	Ni
	Land and Water Conservation/Section 6(f)	Acres (Acres/mile)	0 (0)	E	0 (0)	E	0 (0)	E	4,311.75	Ni	0.9 (0.3)	Ni
	Protected Species Areas	Linear feet of streams with darter habitat (Linear feet of streams/mile)	0 (0)	E	3328 (927)	Ni	2379 (666.3)	M	0 (0)	E	1697 (458.6)	M
	Protected Species	#	0	E	6	Ni	6	Ni	0	Ni	6	Ni
	Noise Receptors	# (#/mile)	63 (38.4)	M	64 (23.4)	M	91 (25.5)	M	119 (32.5)	M	90 (24.3)	M
	Environmental Justice Population (Low-Income)	% low-income block groups of total block groups intersected by alternative	50.0%	M	50.0%	M	50.0%	M	50.0%	M	50.0%	M
	Environmental Justice Population (Minority)	% minority block groups of total blockgroups intersected by alternative	100.0%	Ni	50.0%	M	50.0%	M	50.0%	M	50.0%	M
	Farmland	Acres (Acres/mile)	27.66 (17.0)	M	35.5 (9.9)	E	36.8 (10.3)	E	36.2 (10.2)	E	35.3 (9.5)	E
	Number of Displacements	# of Structures (#/mile)	63 (38.4)	M	84 (23.4)	M	91 (25.5)	M	119 (32.5)	M	90 (24.3)	M
	Residential	# of Structures	52		64		71		81		78	
	Commercial	# of Structures	11		19		19		13		9	
	Industrial	# of Structures	0		0		0		0		0	
	Institutional	# of Structures	0		1		1		0		3	
	Potential Historic Properties/Section 4(f)	# of properties with structures over 45 years of age (acres)/(#/mile)	18 (39.23) / (8.15)	M	52 (104.59) / (14.48)	M	62 (127.51) / (17.37)	M	74 (177.39) / (29.44)	M	39 (82.41) / (10.54)	M
	Potential Archaeological Sites/Section 4(f)	# of pre-recorded archaeological sites	1	M	0	E	0	E	0	E	0	E
	Cemeteries	#	0	E	0	E	0	E	0	E	0	E
	Native American Interests	#	0	E	0	E	0	E	0	E	0	E
	Air Quality	Qualitative		M		M		M		M		M
	Indirect and Cumulative Effects	Qualitative		M		M		M		M		M
	Construction Impacts	Qualitative		Ni		E		M		M		E
	Mitigation / Avoidance Potential (\$Million)*	Qualitative		Ni		M		E		M		M
	Overall Impacts	Qualitative		M		Ni		Ni		M		M
Costs/ Other	Total Costs	\$ (Million)	15.25	E	50.69	M	55.99	M	44.39	M	54.79	M
	Right of Way (250')	\$ (Million)	8.4		15.8		21.8		23.1		18.9	
	Construction	\$ (Million)	8.8		34.8		34.1		21.2		35.8	
	Operations & Maintenance	\$ (Million) /year	0.96		0.09		0.09		0.08		0.09	
	Benefit/Cost Ratio	B/C	0.1	Ni	5.1	E	4.6	E	4.3	E	4.9	E
	Constructability	Qualitative		E		E		E		M		E
	Marginal Utility	Qualitative		M		M		M		M		M
	Overall Costs	Qualitative		M		M		M		M		M
Overall		Qualitative		M		F		F		M		M

Legend:

E- Exceeds; M- Meets; Ni- Needs Improvement

* Environmental Mitigation (Wetlands/Streams only)/ Individual Permit Anticipated on 2, 3A/B, 4A-F, 5A/B

Distances of Alternatives:

0 = 0 miles; 1 = 300 ft from intersections; 2 = 23.1 miles;

3A = 22.6 miles; 3B = 20.7 miles;

4A = 1.6 miles; 4B-1 = 3.59 miles; 4B-2 = 3.57 miles; 4B-3 = 3.62 miles; 4B-4 = 3.70 miles;

4C-1 = 3.05 miles; 4C-2 = 3.10 miles; 4C-3 = 2.91 miles; 4C-4 = 3.03 miles;

4D-1 = 4.25 miles; 4D-2 = 4.47 miles; 4D-3 = 4.49 miles; 4D-4 = 4.61 miles;

4E-1 = 4.56 miles; 4E-2 = 4.51 miles; 4E-3 = 4.65 miles; 4E-4 = 4.78 miles;

4F-1 = 6.67 miles; 4F-2 = 6.47 miles; 4F-3 = 7.64 miles; 4F-4 = 7.27 miles; 4F-5 = 7.48 miles;

4F-6 = 6.36 miles;

5A = 24.3 miles; 5B = 22.9 miles (environmental analysis length of 16.65 miles)

**Note: The lengths for Alternative 4 will be determined after various links are analyzed in subsequent analyses. The shortest distance for Alternative 4 would be 23.20 miles and the longest distance would be 25.43 miles.



SR 20 Improvements (Canton to Cumming)			Alternatives							
PFs: 0003681, 0002862, 0003682			4C: Macedonia							
Screen 2 Performance Criteria	Units		4C-1: Pink (North)	4C-1: Qualitative	4C-2: Blue (North)	4C-2: Qualitative	4C-3: Red (East)	4C-3: Qualitative	4C-4: Orange (South)	4C-4: Qualitative
Performance	Travel Time Savings (2040)	Minutes (Total)	reduced by 11 minutes	M	reduced by 11 minutes	M	reduced by 8 minutes	F	reduced by 11 minutes	M
	User Benefits	Hours of Delay (Total)	reduced by 800	E	reduced by 800	E	reduced by 50	F	reduced by 800	E
		Fuel Saved (per capita)	16.3	M	15.8	M	19.3	M	16.5	M
	Level of Service (2040)	Volume / Capacity Ratio (V/C)	0.86	F	0.86	F	1.03	F	0.86	F
	Travel Time Index (2040)	Free Flow/ Congested Travel Time	1.71	M	1.71	M	1.85	M	1.71	M
	Access to Employment Centers (2040)	# of Origin / Destination (O/D) Trips in Canton/Cumming Only	335,100	M	335,100	M	335,270	M	335,100	M
	Access management	Qualitative	M		M		M		M	
	Safety	Qualitative	M		M		M		M	
	Overall Performance	Qualitative	F		F		F		F	
	Streams	Linear Feet (Linear Feet/mile)	3670.0 (1203.3)	NI	1027.7 (331.5)	M	132.8 (43.2)	E	1350.8 (445.6)	M
Potential Environmental and Community Impacts	Wetlands	Acres (Acres/mile)	0 (0)	E	0 (0.0)	E	0 (0.0)	E	0 (0.0)	E
	Lakes & Ponds	Acres (Acres/mile)	0.4 (0.13)	M	0.1 (0.05)	M	0.2 (0.1)	M	0 (0)	E
	Floodplains	Acres (Acres/mile)	1.8 (0.6)	M	1.8 (0.6)	M	1.8 (0.6)	M	1.8 (0.6)	M
	Conservation Areas/Parks/Section 4(f)	Acres (Acres/mile)	36.6 (11.8)	NI	35.7 (11.5)	NI	35.3 (11.5)	NI	0 (0)	E
	Land and Water Conservation/Section 6(f)	Acres (Acres/mile)	0 (0)	E	0 (0)	E	0 (0)	E	0 (0)	E
	Protected Species Areas	Linear feet of streams with darter habitat (Linear feet of streams/mile)	3670 (1,203.3)	NI	1028 (331.5)	M	103 (35.2)	E	1351 (445.6)	M
	Protected Species	#	6	NI	6	NI	8	NI	6	NI
	Noise Receptors	# (#/mile)	60 (19.7)	M	76 (24.5)	M	106 (35.7)	M	93 (30.8)	M
	Environmental Justice Population (Low-Income)	% low-income block groups of total block groups intersected by alternative	33.3%	M	33.3%	M	33.3%	M	33.3%	M
	Environmental Justice Population (Minority)	% minority block groups of total blockgroups intersected by alternative	0.0%	E	0.0%	E	0.0%	E	0.0%	E
	Farmland	Acres (Acres/mile)	55.5 (19.2)	M	45.6 (14.7)	M	11.7 (3.9)	E	58.6 (19.3)	M
	Number of Displacements	# of Structures (#/mile)	60 (19.7)	M	76 (24.5)	M	106 (35.7)	M	93 (30.8)	M
	Residential	# of Structures	52		65		71		85	
	Commercial	# of Structures	7		10		13		6	
	Industrial	# of Structures	0		0		0		0	
	Institutional	# of Structures	1		1		3		2	
	Potential Historic Properties/Section 4(f)	# of properties with structures over 45 years of age (acres)/(#/mile)	25 (85.8) / (8.28)	M	48 (15.48)	M	55 (18.84)	M	18 (58.8) / (5.94)	M
	Potential Archaeological Sites/Section 4(f)	# of pre-recorded archaeological sites	1	M	1	M	1	M	0	E
	Cemeteries	#	0	E	0	E	1	NI	0	E
	Native American Interests	#	0	E	0	E	0	F	0	E
	Air Quality	Qualitative		M		M		M		M
	Indirect and Cumulative Effects	Qualitative		M		M		M		M
	Construction Impacts	Qualitative		E		E		NI		E
	Mitigation / Avoidance Potential (\$Million)*	Qualitative		M		M		NI		M
	Overall Impacts	Qualitative		NI		NI		M		M
Costs/ Other	Total Costs	\$ (Million)	47.37	M	49.97	M	39.07	E	39.67	E
	Right of Way (250')	\$ (Million)	18.7		23.9		23.9		12.5	
	Construction	\$ (Million)	28.6		26		15.1		27.1	
	Operations & Maintenance	\$ (Million) /year	0.07		0.07		0.07		0.07	
	Benefit/Cost Ratio	B/C	3.8	M	3.2	M	3.8	NI	3.9	E
	Constructability	Qualitative		E		M		M		E
	Marginal Utility	Qualitative		M		M		NI		M
	Overall Costs	Qualitative		M		M		M		M
	Overall	Qualitative		F		F		M		M

Legend:

E- Exceeds; M- Meets; NI- Needs Improvement

* Environmental Mitigation (Wetlands/Streams only)/ Individual Permit Anticipated on 2, 3A/B, 4A-F, 5A/B

Distances of Alternatives:

0 = 0 miles; 1 = 300 ft from intersections; 2 = 23.1 miles;

3A = 22.6 miles; 3B = 20.7 miles;

4A = 1.6 miles; 4B-1 = 3.59 miles; 4B-2 = 3.57 miles; 4B-3 = 3.62 miles; 4B-4 = 3.70 miles;

4C-1 = 3.05 miles; 4C-2 = 3.10 miles; 4C-3 = 2.91 miles; 4C-4 = 3.03 miles;

4D-1 = 4.25 miles; 4D-2 = 4.47 miles; 4D-3 = 4.49 miles; 4D-4 = 4.61 miles;

4E-1 = 4.56 miles; 4E-2 = 4.51 miles; 4E-3 = 4.65 miles; 4E-4 = 4.78 miles;

4F-1 = 6.67 miles; 4F-2 = 6.47 miles; 4F-3 = 7.64 miles; 4F-4 = 7.27 miles; 4F-5 = 7.48 miles;

4F-6 = 6.36 miles;

5A = 24.3 miles; 5B = 22.9 miles (environmental analysis length of 16.65 miles)

**Note: The lengths for Alternative 4 will be determined after various links are analyzed in subsequent

analyses. The shortest distance for Alternative 4 would be 23.20 miles and the longest distance would be 25.43

miles.



SR 20 Improvements (Canton to Cumming)			Alternatives							
PFs: 0003681, 0002862, 0003682			4D. Lathetown							
Screen 2 Performance Criteria	Units		4D-1 Blue (North)	4D-1 Qualitative	4D-2 Green (North)	4D-2 Qualitative	4D-3 Red (East)	4D-3 Qualitative	4D-4 Yellow (South)	4D-4 Qualitative
Performance	Travel Time Savings (2040)	Minutes (Total)	reduced by 20 minutes	M	reduced by 20 minutes	M	reduced by 14 minutes	M	reduced by 20 minutes	M
	User Benefits	Hours of Delay (Total)	reduced by 1,600	E	reduced by 1,600	E	reduced by 500	F	reduced by 1,600	E
		Fuel Saved (per capita)	16.8	M	14.6	M	20.8	M	13.2	M
	Level of Service (2040)	Volume / Capacity Ratio (V/C)	0.79	M	0.79	M	0.88	F	0.79	M
	Travel Time Index (2040)	Free Flow/ Congested Travel Time	1.48	M	1.48	M	1.71	M	1.48	M
	Access to Employment Centers (2040)	# of Origin / Destination (O/D) Trips in Canton/Cumming Only	334,800	M	334,800	M	335,200	M	334,800	M
	Access management	Qualitative		M		M		M		M
	Safety	Qualitative		M		M		M		M
	Overall Performance	Qualitative		M		M		F		M
Potential Environmental and Community Impacts	Streams	Linear Feet (Linear Feet/mile)	2676.6 (676.8)	M	2228.0 (498.4)	M	2194.5 (488.0)	M	2412.0 (523.2)	M
	Wetlands	Acres (Acres/mile)	0 (0.0)	E	0 (0.0)	E	0 (0.0)	E	0 (0.0)	E
	Lakes & Ponds	Acres (Acres/mile)	0.8 (0.2)	M	1.3 (0.3)	NI	0.4 (0.1)	M	1.9 (0.4)	NI
	Floodplains	Acres (Acres/mile)	13.4 (3.1)	NI	12.0 (2.7)	NI	10.7 (2.4)	NI	10.7 (2.3)	NI
	Conservation Areas/Parks/Section 4(f)	Acres (Acres/mile)	0 (0)	E	0 (0)	E	0 (0)	E	0 (0)	E
	Land and Water Conservation/Section 6(f)	Acres (Acres/mile)	0 (0)	E	0 (0)	E	0 (0)	E	0 (0)	E
	Protected Species Areas	Linear feet of streams with darter habitat (Linear feet of streams/mile)	2877 (676.8)	M	2228 (498.4)	M	2190 (488.0)	M	2412 (523.2)	M
	Protected Species	#	6	NI	6	NI	8	NI	6	NI
	Noise Receptors	# (#/mile)	72 (16.9)	E	93 (20.8)	M	143 (32.7)	M	100 (21.7)	M
	Environmental Justice Population (Low-Income)	% low-income block groups of total block groups intersected by alternative	25.0%	E	25.0%	E	20.0%	E	20.0%	E
	Environmental Justice Population (Minority)	% minority block groups of total blockgroups intersected by alternative	0.0%	E	0.0%	E	0.0%	E	0.0%	E
	Farmland	Acres (Acres/mile)	74.3 (17.5)	M	68.1 (15.2)	M	43.2 (9.6)	E	49.9 (10.8)	E
	Number of Displacements	# of Structures (#/mile)	72 (16.9)	E	93 (20.8)	M	143 (32.7)	M	100 (21.7)	M
	Residential	# of Structures	56		69		36		63	
	Commercial	# of Structures	15		22		63		36	
	Industrial	# of Structures	0		1		2		0	
	Institutional	# of Structures	1		1		5		1	
	Potential Historic Properties/Section 4(f)	# of properties with structures over 45 years of age (acres)/(#/mile)	41 (136.45) / (9.65)	M	53 (132.6) / (11.86)	M	80 (156.0) / (35.94)	M	63 (147.1) / (13.67)	M
	Potential Archaeological Sites/Section 4(f)	# of pre-recorded archaeological sites	3	M	1	M	1	M	2	M
	Cemeteries	#	0	E	0	E	1	NI	0	E
	Native American Interests	#	3	M	1	M	4	M	1	M
	Air Quality	Qualitative		M		M		M		M
	Indirect and Cumulative Effects	Qualitative		M		M		M		M
	Construction Impacts	Qualitative		E		M		M		M
	Mitigation / Avoidance Potential (\$Million)*	Qualitative		M		M		M		M
	Overall Impacts	Qualitative		M		NI		M		NI
Costs/ Other	Total Costs	\$ (Million)	65.4	M	75.8	M	65.98	M	60	M
	Right of Way (250')	\$ (Million)	26.7		36		43.7		22.5	
	Construction	\$ (Million)	38.6		39.7		25.7		37.4	
	Operations & Maintenance	\$ (Million) /year	0.1		0.1		0.05		0.1	
	Benefit/Cost Ratio	B/C	3.3	M	3	M	1.8	NI	3.9	E
	Constructability	Qualitative		E		E		M		M
	Marginal Utility	Qualitative		M		M		NI		M
	Overall Costs	Qualitative		M		M		M		M
	Overall	Qualitative		M		F		M		F
	Legend: E- Exceeds; M- Meets; NI- Needs Improvement * Environmental Mitigation (Wetlands/Streams only)/ Individual Permit Anticipated on 2, 3A/B, 4A-F, 5A/B Distances of Alternatives: 0 = 0 miles; 1 = 300 ft from intersections; 2 = 23.1 miles; 3A = 22.6 miles; 3B = 20.7 miles; 4A = 1.6 miles; 4B-1 = 3.59 miles; 4B-2 = 3.57 miles; 4B-3 = 3.62 miles; 4B-4 = 3.70 miles; 4C-1 = 3.05 miles; 4C-2 = 3.10 miles; 4C-3 = 2.91 miles; 4C-4 = 3.03 miles; 4D-1 = 4.25 miles; 4D-2 = 4.47 miles; 4D-3 = 4.49 miles; 4D-4 = 4.61 miles; 4E-1 = 4.56 miles; 4E-2 = 4.51 miles; 4E-3 = 4.65 miles; 4E-4 = 4.78 miles; 4F-1 = 6.67 miles; 4F-2 = 6.47 miles; 4F-3 = 7.64 miles; 4F-4 = 7.27 miles; 4F-5 = 7.48 miles; 4F-6 = 6.36 miles; 5A = 24.3 miles; 5B = 22.9 miles (environmental analysis length of 16.65 miles) **Note: The lengths for Alternative 4 will be determined after various links are analyzed in subsequent analyses. The shortest distance for Alternative 4 would be 23.20 miles and the longest distance would be 25.43 miles.									



SR 20 Improvements (Canton to Cumming)			Alternatives							
PFs: 0003681, 0002862, 0003682			4E, Ducktown							
Screen 2 Performance Criteria	Units		4E-1 Pink (North)	4E-1 Qualitative	4E-2 Red (East)	4E-2 Qualitative	4E-3 Blue (South)	4E-3 Qualitative	4E-4 Orange (South)	4E-4 Qualitative
Performance	Travel Time Savings (2040)	Minutes (Total)	reduced by 8 minutes	F	reduced by 5 minutes	F	reduced by 8 minutes	F	reduced by 8 minutes	F
	User Benefits	Hours of Delay (Total)	reduced by 500	F	reduced by 100	F	reduced by 500	F	reduced by 500	F
		Fuel Saved (per capita)	15.2	M	18.2	M	14.1	M	12.4	M
	Level of Service (2040)	Volume / Capacity Ratio (V/C)	0.73	M	0.84	M	0.73	M	0.73	M
	Travel Time Index (2040)	Free Flow/ Congested Travel Time	1.40	M	1.40	M	1.40	M	1.40	M
	Access to Employment Centers (2040)	# of Origin / Destination (O/D) Trips in Canton/Cumming Only	335,000	M	335,000	M	335,000	M	335,000	M
	Access management	Qualitative	M		M		M		M	
	Safety	Qualitative	M		M		M		M	
	Overall Performance	Qualitative	F		F		F		F	
	Streams	Linear Feet (Linear Feet/mile)	5762.9 (1263.8)	NI	5744.3 (1263.8)	M	5503.1 (1193.5)	NI	4650.2 (972.84)	M
Potential Environmental and Community Impacts	Wetlands	Acres (Acres/mile)	0 (0.0)	E	0 (0.0)	E	0 (0.0)	E	0 (0.0)	E
	Lakes & Ponds	Acres (Acres/mile)	0 (0)	E	0.0 (0.2)	M	3.4 (0.7)	NI	3.3 (0.7)	NI
	Floodplains	Acres (Acres/mile)	8.8 (1.5)	M	2.0 (0.4)	M	8.3 (1.8)	M	12.6 (2.6)	NI
	Conservation Areas/Parks/Section 4(f)	Acres (Acres/mile)	0 (0)	E	0 (0)	E	0 (0)	E	0 (0)	E
	Land and Water Conservation/Section 6(f)	Acres (Acres/mile)	0 (0)	E	0 (0)	E	0 (0)	E	0 (0)	E
	Protected Species Areas	Linear feet of streams with darter habitat (Linear feet of streams/mile)	4729 (1,037.1)	NI	314 (80.7)	E	144 (31)	E	144 (30.1)	E
	Protected Species	#	6	NI	6	NI	6	NI	6	NI
	Noise Receptors	# (#/mile)	133 (29.2)	M	152 (33.7)	M	131 (28.2)	M	124 (25.9)	M
	Environmental Justice Population (Low-Income)	% low-income block groups of total block groups intersected by alternative	50.0%	M	42.9%	M	50.0%	M	50.0%	M
	Environmental Justice Population (Minority)	% minority block groups of total blockgroups intersected by alternative	0.0%	E	0.0%	E	0.0%	E	0.0%	E
	Farmland	Acres (Acres/mile)	65.5 (14.4)	M	48.4 (10.7)	E	102.1 (22.0)	NI	68.9 (14.4)	M
	Number of Displacements	# of Structures (#/mile)	133 (29.2)	M	152 (33.7)	M	131 (28.2)	M	124 (25.9)	M
	Residential	# of Structures	86		92		117		114	
	Commercial	# of Structures	40		61		12		8	
	Industrial	# of Structures	2		1		1		1	
	Institutional	# of Structures	5		5		1		1	
	Potential Historic Properties/Section 4(f)	# of properties with structures over 45 years of age (acres)/(#/mile)	77 (171.17) (18.89)	M	95 (190.49) (21.06)	M	31 (6.87) (151.17)	M	31 (6.49) (110.17)	M
	Potential Archaeological Sites/Section 4(f)	# of pre-recorded archaeological sites	1	M	1	M	0	E	1	NI
	Cemeteries	#	1	NI	1	NI	0	E	0	E
	Native American Interests	#	0	E	0	E	0	E	0	E
	Air Quality	Qualitative		M		M		M		M
	Indirect and Cumulative Effects	Qualitative		M		M		M		M
	Construction Impacts	Qualitative		E		E		M		M
	Mitigation / Avoidance Potential (\$Million)*	Qualitative		E (1.1)		E (0.8)		E (1.7)		E (1.1)
	Overall Impacts	Qualitative		M		M		NI		NI
Costs/ Other	Total Costs	\$ (Million)	75.4	M	54.96	M	73.81	M	85.81	NI
	Right of Way (250')	\$ (Million)	39.1		34.5		24.5		32.6	
	Construction	\$ (Million)	36.2		20.1		49.2		53.1	
	Operations & Maintenance	\$ (Million) /year	0.1		0.08		0.11		0.11	
	Benefit/Cost Ratio	B/C	2.8	M	1.8	M	2.9	M	2.6	M
	Constructability	Qualitative		E		M		E		E
	Marginal Utility	Qualitative		M		M		M		M
	Overall Costs	Qualitative		M		M		M		M
	Overall	Qualitative		M		M		F		F

Legend:

E- Exceeds; M- Meets; NI- Needs Improvement

* Environmental Mitigation (Wetlands/Streams only)/ Individual Permit Anticipated on 2, 3A/B, 4A-F, 5A/B

Distances of Alternatives:

0 = 0 miles; 1 = 300 ft from intersections; 2 = 23.1 miles;

3A = 22.6 miles; 3B = 20.7 miles;

4A = 1.6 miles; 4B-1 = 3.59 miles; 4B-2 = 3.57 miles; 4B-3 = 3.62 miles; 4B-4 = 3.70 miles;

4C-1 = 3.05 miles; 4C-2 = 3.10 miles; 4C-3 = 2.91 miles; 4C-4 = 3.03 miles;

4D-1 = 4.25 miles; 4D-2 = 4.47 miles; 4D-3 = 4.49 miles; 4D-4 = 4.61 miles;

4E-1 = 4.56 miles; 4E-2 = 4.51 miles; 4E-3 = 4.65 miles; 4E-4 = 4.78 miles;

4F-1 = 6.67 miles; 4F-2 = 6.47 miles; 4F-3 = 7.64 miles; 4F-4 = 7.27 miles; 4F-5 = 7.48 miles;

4F-6 = 6.36 miles;

5A = 24.3 miles; 5B = 22.9 miles (environmental analysis length of 16.65 miles)

**Note: The lengths for Alternative 4 will be determined after various links are analyzed in subsequent analyses. The shortest distance for Alternative 4 would be 23.20 miles and the longest distance would be 25.43 miles.



SR 20 Improvements (Canton to Cumming)			Alternatives											
PFs: 0003681, 0002862, 0003682			4F: Cumming											
Screen 2 Performance Criteria	Units		4F-1: Green (North)	4F-1: Qualitative	4F-2: Yellow (North)	4F-2: Qualitative	4F-3: Red (East)	4F-3: Qualitative	4F-4: Pink (South)	4F-4: Qualitative	4F-5: Orange (Veterans Memorial)	4F-5: Qualitative	4F-6: Blue (South) - Chamblee Gap	4F-6: Qualitative
Performance	Travel Time Savings (2040)	Minutes (Total)	reduced by 20 minutes	M	reduced by 25 minutes	E	reduced by 25 minutes	E	reduced by 25 minutes	E	reduced by 25 minutes	E	reduced by 19 minutes	M
	User Benefits	Hours of Delay (Total)	reduced by 1,500	M	reduced by 600	F	reduced by 600	F	reduced by 600	F	reduced by 600	F	reduced by 1,700	M
		Fuel Saved (per capita)	36.1	M	31.1	M	31.1	M	31.1	M	31.1	M	41.6	M
	Level of Service (2040)	Volume / Capacity Ratio (V/C)	0.94	F	0.95	F	0.95	F	0.95	F	0.95	F	0.97	F
	Travel Time Index (2040)	Free Flow/ Congested Travel Time	1.96	F	2.01	F	2.01	F	2.01	F	2.01	F	2.09	F
	Access to Employment Centers (2040)	# of Origin / Destination (O/D) Trips in Canton/Cumming Only	335,300	M	335,200	M	335,300	M	335,200	M	335,200	M	337,900	M
	Access management	Qualitative	M	M	M	M	M	M	M	M	M	M	M	M
	Safety	Qualitative	M	M	M	M	M	M	M	M	M	M	M	M
	Overall Performance	Qualitative	F	F	F	F	F	F	F	F	F	F	F	F
Potential Environmental and Community Impacts	Streams	Linear Feet (Linear Feet/mile)	8555.7 (982.56)	M	6185.7 (956.06)	M	9181.1 (945.71)	M	11582.7 (1549.82)	Ni	8708.39 (1197.85)	Ni	9015.7 (1417.57)	Ni
	Wetlands	Acres (Acres/mile)	0 (0.0)	E	2.1 (0.32)	M	2.1 (0.27)	M	2.1 (0.28)	M	0.8 (0.11)	M	5.1 (0.8)	Ni
	Lakes & Ponds	Acres (Acres/mile)	0 (0)	E	0 (0)	E	0 (0)	E	1.2 (0.2)	M	0.5 (0.07)	M	1.0 (0.2)	M
	Floodplains	Acres (Acres/mile)	9.7 (1.5)	M	9.9 (1.5)	M	14.6 (1.8)	M	15 (2)	M	15.1 (2.1)	M	29.4 (3.2)	Ni
	Conservation Areas/Parks/Section 4(f)	Acres (Acres/mile)	11.2 (1.7)	Ni	15.7 (2.4)	Ni	11.2 (1.8)	Ni	11.2 (1.8)	Ni	11.2 (1.8)	Ni	0 (0)	E
	Land and Water Conservation/Section 6(f)	Acres (Acres/mile)	0 (0)	E	4.4 (0.7)	Ni	0 (0)	E	0 (0)	E	0 (0)	E	0 (0)	E
	Protected Species Areas	Linear feet of streams with darter habitat (Linear feet of streams/mile)	0 (0)	E	0 (0)	E	0 (0)	E	0 (0)	E	0 (0)	E	0 (0)	E
	Protected Species	#	3	Ni	3	Ni	3	Ni	3	Ni	3	Ni	3	Ni
	Noise Receptors	# (#/mile)	268 (40.2)	M	306 (47.3)	Ni	494 (59.4)	Ni	341 (46.9)	Ni	363 (48.5)	Ni	261 (41.0)	M
	Environmental Justice Population (Low-Income)	% low-income block groups of total block groups intersected by alternative	66.7%	Ni	63.6%	Ni	58.3%	Ni	66.7%	Ni	66.7%	Ni	63.6%	Ni
	Environmental Justice Population (Minority)	% minority block groups of total block groups intersected by alternative	33.3%	M	54.5%	Ni	54.5%	Ni	50.0%	M	50.0%	M	45.50%	M
	Farmland	Acres (Acres/mile)	29.7 (4.5)	E	37.5 (5.6)	E	38.2 (5.6)	E	52.4 (7.0)	M	61.3 (8.4)	E	100 (15.7)	M
	Number of Displacements	# of Structures (#/mile)	265 (40.2)	M	306 (47.3)	Ni	454 (59.4)	Ni	341 (46.9)	Ni	363 (48.5)	Ni	261 (41.0)	M
	Residential	# of Structures	177		137		106		115		194		190	
	Commercial	# of Structures	73		143		128		204		145		49	
	Industrial	# of Structures	2		2		2		7		11		15	
	Institutional	# of Structures	16		24		17		15		23		7	
	Potential Historic Properties/Section 4(f)	# of properties with structures over 45 years of age (acres)/#(mile)	72 (109.8)/ (10.79)	M	101 (15.61)	M	130 (123.21) (14.45)	Ni	83 (141.4)/ (11.42)	Ni	94 (118.3)/ (12.57)	M	37 (64.0)/ (5.82)	M
	Potential Archaeological Sites/Section 4(f)	# of pre-recorded archaeological sites	0	E	0	E	0	E	0	E	0	E	1	M
	Cemeteries	#	0	E	0	E	0	Ni	1	Ni	0	E	0	E
	Native American Interests	#	0	E	0	E	0	E	0	E	0	E	0	E
	Air Quality	Qualitative		M		M		M		M		M		M
	Indirect and Cumulative Effects	Qualitative		M		M		M		M		M		M
	Construction Impacts	Qualitative		M		Ni		Ni		Ni		Ni		M
	Mitigation / Avoidance Potential (\$Million)*	Qualitative		E		E		Ni		Ni		E		E
	Overall Impacts	Qualitative		M		M		M		M		M		F
Costs/ Other	Total Costs	\$ (Million)	101.59	Ni	94.68	Ni	121.11	Ni	91.97	Ni	117.52	Ni	86.88	Ni
	Right of Way (250')	\$ (Million)	45.9		47.1		79.8		49		54.8		32.1	
	Construction	\$ (Million)	55.5		47.4		39.1		42.8		62.5		54.6	
	Operations & Maintenance	\$ (Million) /year	0.19		0.18		0.21		0.17		0.22		0.18	
	Benefit/Cost Ratio	B/C	4.0	E	2.8	M	2.6	M	2.5	M	3.3	M	4.6	E
	Constructability	Qualitative		E		M		Ni		Ni		M		E
	Marginal Utility	Qualitative		M		M		M		M		M		M
	Overall Costs	Qualitative		M		M		M		M		M		M
	Overall	Qualitative		M		M		M		M		M		F
Legend:			E- Exceeds; M- Meets; Ni- Needs Improvement * Environmental Mitigation (Wetlands/Streams only)/ Individual Permit Anticipated on 2, 3A/B, 4A-1, 5A/B Distances of Alternatives: 0 = 0 miles; 1 = 300 ft from intersections; 2 = 23.1 miles; 3A = 22.6 miles; 3B = 20.7 miles; 4A = 1.6 miles; 4B-1 = 3.59 miles; 4B-2 = 3.57 miles; 4B-3 = 3.62 miles; 4B-4 = 3.70 miles; 4C-1 = 3.05 miles; 4C-2 = 3.10 miles; 4C-3 = 2.91 miles; 4C-4 = 3.03 miles; 4D-1 = 4.25 miles; 4D-2 = 4.47 miles; 4D-3 = 4.49 miles; 4D-4 = 4.61 miles; 4E-1 = 4.56 miles; 4E-2 = 4.51 miles; 4E-3 = 4.65 miles; 4E-4 = 4.78 miles; 4F-1 = 6.67 miles; 4F-2 = 6.47 miles; 4F-3 = 7.64 miles; 4F-4 = 7.27 miles; 4F-5 = 7.48 miles; 4F-6 = 6.36 miles; 5A = 24.3 miles; 5B = 22.9 miles (environmental analysis length of 16.65 miles) **Note: The lengths for Alternative 4 will be determined after various links are analyzed in subsequent analyses. The shortest distance for Alternative 4 would be 23.20 miles and the longest distance would be 25.43 miles.											



SR 20 Improvements (Canton to Cumming)			Alternatives				
PF's: 0003681, 0002862, 0003682			5. Alt 4 Plus Reroutings				
Screen 2 Performance Criteria		Units	SA: Widen SR 20 and Reroute onto SR 389	SA: Qualitative	SB: Widen SR 20 and Reroute onto Bethelview Rd	SB: Qualitative	
Performance	Travel Time Savings (2040)	Minutes (Total)	reduced by 40 minutes (majority of travel time savings come from widening of Buffington and Macedonia)	M	qualitative	M	
	User Benefits	Hours of Delay (Total)	reduced by 2,700	M	qualitative	M	
		Fuel Saved (per capita)	67.5	M	qualitative	M	
	Level of Service (2040)	Volume / Capacity Ratio (V/C)	0.98	F	qualitative	F	
	Travel Time Index (2040)	Free Flow/ Congested Travel Time	2.07	F	qualitative	F	
	Access to Employment Centers (2040)	# of Origin / Destination (O/D) Trips in Canton/Cumming Only	324,600	F	qualitative	M	
	Access management	Qualitative		M		F	
	Safety	Qualitative		M		M	
	Overall Performance	Qualitative		F		F	
Potential Environmental and Community Impacts	Streams	Linear Feet (Linear Feet/mile)	14,760.3 (607.92)	M	4,197.0 (252.07)	M	
	Wetlands	Acres (Acres/mile)	1.0 (0.04)	M	0.0	E	
	Lakes & Ponds	Acres (Acres/mile)	2.9 (0.1)	M	1.4 (0.1)	M	
	Floodplains	Acres (Acres/mile)	43.5 (1.8)	M	11.8 (0.7)	M	
	Conservation Areas/Parks/Section 4(f)	Acres (Acres/mile)	15.9 (0.7)	NI	14.57 (0.88)	NI	
	Land and Water Conservation/Section 6(f)	Acres (Acres/mile)	4.3 (0.2)	NI	4.28 (0.3)	NI	
	Protected Species Areas	Linear feet of streams with darter habitat (Linear feet of streams/mile)	14036 (578.1)	M	2,366 (142.1)	M	
	Protected Species	#	6	NI	6	NI	
	Noise Receptors	# (#/mile)	567 (23.4)	M	566 (34)	M	
	Environmental Justice Population (Low-Income)	% low-income block groups of total block groups intersected by alternative	23.5%	E	23.5%	E	
	Environmental Justice Population (Minority)	% minority block groups of total blockgroups intersected by alternative	23.5%	E	20.0%	E	
	Farmland	Acres (Acres/mile)	360.9 (16.1)	M	168.4 (10.1)	E	
	Number of Displacements	# of Structures (#/mile)	567 (23.4)	M	566 (34)	M	
	Residential	# of Structures	375		327		
		Commercial	# of Structures	170		216	
		Industrial	# of Structures	3		5	
		Institutional	# of Structures	19		18	
	Potential Historic Properties/Section 4(f)	# of properties with structures over 45 years of age (acres)/(#/mile)	240 (449.4) / (9.88)	M	314 (531.5) / (18.86)	M	
	Potential Archaeological Sites/Section 4(f)	# of pre-recorded archaeological sites	8	NI	4	M	
	Cemeteries	#	9	NI	6	NI	
	Native American Interests	#	5	NI	1	NI	
	Air Quality	Qualitative		M		M	
	Indirect and Cumulative Effects	Qualitative		M		M	
	Construction Impacts	Qualitative		M		M	
	Mitigation / Avoidance Potential (\$Million)*	Qualitative		NI (2.5)		M (0.6)	
	Overall Impacts	Qualitative		M		M	
Costs/ Other	Total Costs	\$ (Million)	248.55	M	229.08	M	
	Right of Way (250')	\$ (Million)	102		133.6		
	Construction	\$ (Million)	146		95.1		
	Operations & Maintenance	\$ (Million) /year	0.55		0.38		
	Benefit/Cost Ratio	B/C	2.3	M	qualitative	NI	
	Constructability	Qualitative		M		M	
	Marginal Utility	Qualitative		NI		NI	
	Overall Costs	Qualitative		NI		NI	
Overall	Qualitative		F		F		
Legend: E- Exceeds; M- Meets; NI- Needs Improvement * Environmental Mitigation (Wetlands/Streams only/ Individual Permit Anticipated on 2, 3A/8, 4A-1, 5A/8 Distances of Alternatives: 0 = 0 miles; 1 = 300 ft from intersections; 2 = 23.3 miles; 3A = 22.6 miles; 3B = 20.7 miles; 4A = 1.6 miles; 4B-1 = 3.59 miles; 4B-2 = 3.57 miles; 4B-3 = 3.62 miles; 4B-4 = 3.70 miles; 4C-1 = 3.05 miles; 4C-2 = 3.30 miles; 4C-3 = 2.91 miles; 4C-4 = 3.03 miles; 4D-1 = 4.25 miles; 4D-2 = 4.47 miles; 4D-3 = 4.49 miles; 4D-4 = 4.63 miles; 4E-1 = 4.56 miles; 4E-2 = 4.51 miles; 4E-3 = 4.65 miles; 4E-4 = 4.78 miles; 4F-1 = 6.67 miles; 4F-2 = 6.47 miles; 4F-3 = 7.64 miles; 4F-4 = 7.27 miles; 4F-5 = 7.48 miles; 4F-6 = 6.36 miles; 5A = 24.3 miles; 5B = 22.9 miles (environmental analysis length of 16.65 miles) **Note- The lengths for Alternative 4 will be determined after various links are analyzed in subsequent analyses. The shortest distance for Alternative 4 would be 23.20 miles and the longest distance would be 25.43 miles.			*NOTE: SR 389 programmed for widening in Regional Transportation Plan and Bethelview Road to be widened under separate project				

Legend:

E- Exceeds; M- Meets; NI- Needs Improvement

* Environmental Mitigation (Wetlands/Streams only)/ Individual Permit Anticipated on 2, 3A/B, 4A-F, 5A/B

Distances of Alternatives:

0 = 0 miles; 1 = 300 ft from intersections; 2 = 23.1 miles;

3A = 22.6 miles; 3B = 20.7 miles;

4A = 1.6 miles; 4B-1 = 3.59 miles; 4B-2 = 3.57 miles; 4B-3 = 3.62 miles; 4B-4 = 3.70 miles;

4C-1 = 3.05 miles; 4C-2 = 3.10 miles; 4C-3 = 2.91 miles; 4C-4 = 3.03 miles;

4D-1 = 4.25 miles; 4D-2 = 4.47 miles; 4D-3 = 4.49 miles; 4D-4 = 4.61 miles;

4E-1 = 4.56 miles; 4E-2 = 4.51 miles; 4E-3 = 4.65 miles; 4E-4 = 4.78 miles;

4F-1 = 6.67 miles; 4F-2 = 6.47 miles; 4F-3 = 7.64 miles; 4F-4 = 7.27 miles; 4F-5 = 7.48 miles;

4F-6 = 6.36 miles;

5A = 24.3 miles; 5B = 22.9 miles (environmental analysis length of 16.65 miles)

**Note: The lengths for Alternative 4 will be determined after various links are analyzed in subsequent analyses. The shortest distance for Alternative 4 would be 23.20 miles and the longest distance would be 25.43 miles.

*NOTE: SR 389 programmed for widening in Regional Transportation Plan and Bethelview Road to be widened under separate project

Attachment 11


VE Implementation Letter

**DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA**

INTERDEPARTMENT CORRESPONDENCE

FILE: Cherokee & Forsyth Co. **OFFICE:** Engineering Services
P.I. No.: 0014131, 0014132, 0014133, 0002862, 0003682
SR 20 from CR281/Scott Road to SR 400

DATE: August 2, 2017

FROM: Lisa L. Myers, State Project Review Engineer 

TO: Albert Shelby, Director of Program Delivery
Attn.: Cleopatra James

SUBJECT: IMPLEMENTATION OF VALUE ENGINEERING STUDY ALTERNATIVES

The VE Study for the above projects was held February 27 thru March 2, 2017. Revised responses were received on August 1, 2017. Recommendations for implementation of Value Engineering Study Alternatives are indicated in the table below. The Project Manager shall incorporate the VE alternatives recommended for implementation to the extent reasonable in the design of the project. Please note, if the implementation of any VE recommendation requires a Design Exception and/or Design Variance, those must be requested separately.

ALT #	Description	Potential Savings/ LCC	Implement	Comments
1.0	Reduce widening from 6 to 4 lanes at Union Hill Road to SR 371.	\$23,515,000	No	The growth trends show that soon after the design year, volumes will be great enough to require 6-lanes. GDOT prefers to provide 6-lanes for consistency as well as to address the likely need so the design team will proceed with the original design.
2.0	Reduce Lane widths from 12' to 11' wide for all lanes.	\$9,484,000	No	The design team has agreed to 2.1 instead.
2.1	Reduce inner lane widths in each direction from 12' to 11' wide (outside lanes remain 12' wide).	\$6,335,000	Yes	This will be implemented.
3.0	Reduce median width from 20' to 16' wide.	\$2,730,000	No	Please review the design team's entire explanation for rejecting this idea. The narrower median suggestion would make it more difficult for large vehicles to use the Restricted Crossing U-Turns (R-Cuts). The proposed 20 foot wide median allows for landscaping in a larger green space for the current context sensitive design.

4.0	Construct rural shoulder with 10' wide overall shoulder with 4' wide partial depth pavement.	\$7,872,000	No	This corridor resides in a MS4 region and runs along a topographical ridge line. See the designer's response for more details, but a rural shoulder would not provide any containment or retention to help satisfy water quality goals of MS4.
4.1	Construct 12' wide urban shoulder in lieu of the 16' wide shoulder.	Proposed = \$5,430,000 Actual = \$1,097,730	Yes, with modifications	The designers will use this narrow shoulder option in areas to help minimize adverse impacts to adjacent resources.
7.0	Eliminate ponds at five property displacements for (PI# 0002862 & 0003682)	Proposed = \$4,150,000 Actual = \$1,245,000	Yes, with modifications	Designers will partially implement this suggestion and reduce the required ROW where feasible for the modified savings amount.
10.0	Perform detailed MS4 calculations to allow for elimination of ponds; acquire non-pond parcels first.	Proposed = \$21,755,000 Actual = \$14,503,300	Yes, with modifications	Please see the designers attached full responses for 4.0, 7.0 and 10.0 but after further analysis it is assumed that the ponds can be reduced in size which will reduce the required ROW for the modified savings amount.
12.0	Use a consistent required Right of Way width; and use permanent easement beyond.	Proposed = \$16,950,000 Actual = \$8,430,000	Yes, with modifications	This will be partially implemented for the modified savings amount.
17.0	Use Design/Build Delivery method to meet expedited schedule.	\$8,831,000	No	Time savings could be realized through this delivery method, but with the current accelerated schedule set by the GDOT Commissioner the time has already been condensed.

The Office of Engineering Services concurs with the Project Manager's responses.

Approved: Margaret B. Pirkle Date: 8.16.17
Margaret Pirkle, PE, Chief Engineer

LLM/EAR/MJS

Attachments

Cc: Hiral Patel
Albert Shelby/Kimberly Nesbitt/Cleopatra James
John Hancock
Aaron Burgess
Lisa Wesley
Andrew Pearson
Chuck Hasty/Matt Sanders